

London Housing: Policy, Regulation, Typology and Dimensional Data



Royal College of Art

Draft: February 2021

Sam Jacoby, Lucia Alonso, Seyithan Özer and Dean Black

Laboratory for Design and Machine Learning, Royal College of Art



This research is funded by the Prosit Philosophiae Foundation.

Summary

This is a study of housing in London, which differs in its characteristic in many ways from other parts of England. The examination of housing acts, reports, manuals, design guidelines, policies, and regulations reveal their collective impact on housing provision in London and key moments in the formation of the housing market. It highlights significant historical changes in how 'universal' housing ideals were implemented.

By studying the size and spatial organisation of dwellings, this report examines the design of housing from a historical perspective and analyses what kinds of evidence-based spatial judgments exist and how they impact the design and provision of space in homes.

Chapter 1, 'Policy and Regulation', examines the development of housing regulations and policy over time and highlights the shift from standardised plans to space standards. It analyses how quantitative space standards are derived mainly from qualitative ideas about housing and how space standards have changed over time, producing different design outcomes.

Chapter 2, 'Housing Typologies', studies the design evolution of London's main housing typologies, such as terraced houses, semi-detached housing, maisonettes and flats, but adopts a morphological classification of dwellings through their spatial organisation, number of storeys, and access type. It examines the political, economic, and cultural drivers that have shaped the design of dwellings.

Chapter 3, 'Dimensional Data Analysis', provides a statistical, dimensional, and data-based analysis of 5,278 housing floor plans sampled across London's inner boroughs. It compares the differences and variations of housing design from a dimensional and numerical perspective and demonstrates that morphological characteristics of dwellings are instrumental in analysing housing.

Table of Contents

6	Executive Summary
11	Introduction
19	Chapter 1: Policy and Regulations
111	Chapter 2: Housing Typologies
239	Chapter 3: Dimensional Data Analysis
297	Appendix
299	Bibliography

Executive Summary

This is a study of housing in London, which differs in its characteristic in many ways from other parts of England. The examination of housing acts, reports, manuals, design guidelines, policies, and regulations reveal their collective impact on housing provision in London and key moments in the formation of the housing market. It highlights significant historical changes in how ‘universal’ housing ideals were implemented.

There has been a historical shift in focus of housing policy from general public health concerns to specific design problems linked to space standards and home use in relation to daily routines and the lifecycle of a family household and, more recently, to less tangible design drivers such as sustainability or social value and wellbeing. This was underpinned by health, social, and technical research whose evidence base has informed changing spatial reasoning and housing design. The interplay between socio-cultural transformations or ambitions and measurable assessments has been formative to various housing design standards.

In England, housing reports have been important milestones for new housing acts and design guidelines starting with the *Tudor Walters Report* (1918). England’s best-known space standard, deriving from the *Parker Morris Report* (1961), saw an important shift to non-standard and evidence-based, ‘scientific’ measures. While the report returned to the provision of numerical values and recommendations of minimum standards, it paid particular attention to notions of usability and flexibility. The abolishment of the Parker Morris standards in 1980 marked a significant reduction in government intervention. Space standards soon dropped by 5 to 15% and the marketisation of housing resulted in ‘public housing’, accessible widely to the population, making way for ‘social housing’ that only provides accommodation to those not served by the market.

Space standards are now significantly lower than those in continental Europe. However, there are not only significant shortcomings of space standards in some

housing sectors but also in building regulations. There has been a widespread systemic failure in how regulations meant to safeguard the health and safety of buildings and its occupants have been insufficiently enforced due to far-reaching deregulation and financialisation of the housing market.

From a qualitative to a quantitative assessment of housing, today we see again a cyclical shift towards more qualitative assessment criteria, linked to issues of wellbeing, social value, and, as the most recent government housing report *Living with Beauty: Promoting Health, Well-being and Sustainable Growth* (2020) demonstrates, ideas of aesthetics (beauty). However, current housing policy also shows a fundamental disconnect between housing delivery, supply, and quality assessment from architectural design value, as regulations and standards rely largely on quantifiable performance requirements in which spatial design is often of diminished importance.

There is a lack of more data-driven and evidence-based approaches to the analysis and evaluation of housing outcomes that takes into consideration the multi-scalar problems of housing, including issues of procurement and financing, but also understands better what housing quality indicators mean to occupants. Likewise, while research into the relationship between household, home use, and housing design was essential to housing studies from the post-war period to at least the 1980s, there is a significant knowledge gap how today’s demographics and use patterns compare or if changing housing needs and household compositions are sufficiently served by current housing models.

A key question raised by this housing study is if housing standards are an effective means to safeguarding minimum performance requirements. It also points to the problem of how a minimum requirement is defined and might change over time. How then should minimum standards be determined and reasoned, and how can they be more inclusive of a wider demographic and housing needs?

Housing Regulations

Housing policy and policy instruments are historically contextual to larger external events such as the Industrial Revolution, World War I and II or climate change and technological advancements as well as new national political or economic agendas and socio-cultural transformations.

- Building regulations, housing manuals, and pattern books during the Georgian period led to a first far-reaching standardisation of housing design and details for speculative builders and developments.
- From the use of ‘standard plans’ for Victorian philanthropic model dwellings or the *Tudor Walters Report* (1918), there has been a shift to ‘space standards such as those recommended by the Parker Morris Committee in 1961.
- Today, technical functional requirements based on minimum performance criteria or dimensions that can be quantitatively measured have become most common.
- Current regulations often derive from ‘good practice’ standards with a trade-off between a stronger status at the expense of weaker mandatory requirements.

Housing Assessment and Criteria

The Victorian period, concerned with public health and hygiene, based many of its housing-related policies on medical advice and health statistics. In 1917, housing evidence began to focus on technical research with the establishment of the Building Materials Research Committee. From the 1930s onwards, housing policy and planning has been increasingly based on public opinion and user data collected from occupants and housing interest groups through polls, questionnaires, and surveys, with the first English Housing Survey conducted in 1967. *The Parker Morris Report* (1961) is an example of the social studies that have informed housing policy and standards. Since then, housing has been widely assessed through quantitative metrics and performance requirements that no longer stipulate specific design solutions.

- The evidence base and reasoning informing housing has significantly changed over time, from public health concerns to home use routines and technical building or material performance research.
- Socio-cultural norms and aspirations remain a great determinant of housing and its design.
- Qualitative housing criteria, such as ‘good’ design or ‘social value’ are today largely assessed using quantifiable and dimensional data criteria. Yet, how housing quality is defined or experienced is subjective and varies greatly over time.
- Little reliable research has looked into how quantitative criteria shape housing quality, the use or experience of the home, design decisions, and housing outcomes.

Household Composition and Definitions

The needs of the working family have, since the nineteenth-century, remained a key public housing concern. Housing policy and regulations have therefore been biased towards the spatial needs and organisation of the family, despite significant demographic change over the last decades.

- Historically, the definition of the household has not been limited to familial bonds but extended to that of domestic servants and lodgers. Today, the number of households in London made up of one- or two-person households and unrelated adults living together are rapidly increasing.
- In inner London, the majority of dwellings have one- (30%) and two-bedroom (32%), while in outer London, one-bedroom dwellings account for only 16% and dwellings with three-bedrooms or more make up over half of the housing stock (54%).
- There is a significant mismatch between the availability of dwelling typologies and sizes in comparison to household compositions, and demographics, leading to an increase in housing inequalities and over- or under-occupation of homes. This is in parts due to England having one of the oldest housing stocks in Europe, with 56% in inner London built before 1945.

Space Standards and the Housing Stock

Space standards are the most tangible housing design controls, however, it is not always clear how they are determined and make generalisations about common user needs. As in England properties are marketed based on the number of bedrooms and not floor areas, it shows a continuing tension between socio-cultural factors, housing market dynamics, and regulatory cultures when trying to achieve policy objectives. The conflict between safeguarding space standards and usability and economic drivers of housing has led to space standards becoming a maximum not a minimum design target.

- Space standards in England have fluctuated over-time, reaching an all-time high with the *London Housing Design Guide (2010)* and *Nationally Described Space Standards (2015)*. The overall recommended dwelling sizes followed the changes in space standards, with an increase in the past two decades.
- The majority of the existing housing stock in London is above the current space standards (63%). The figure is less for two-, three, and four-bedroom dwellings, with 56% failing space standards. Significantly, the majority of studio flats (70%) are below the space standards, whereas the majority of one-bedroom dwellings are mostly above (83%).
- While the size of two- and three-storey dwellings is on average larger than that of single-storey dwellings with the same number of habitable rooms, the difference in floor areas is generally less than the additional circulation space needed and does not translate into less usable floor area.
- Dwellings with habitable kitchens (kitchens that are combined with dining and/or living functions) are in comparison larger than those in which kitchen, dining, and living functions are in separate rooms.
- As space standards have been historically only applied to the public sector, there are differences between public- and private-sector housing. Public sector dwellings designed to meet prescribed space standards are smaller than those comparable in the private sector built in the same period.
- Unlike previous studies, we found that the average size of a dwelling in London has increased since the 1980s, despite space standards not being in use for much of this period.

Evolution of Dwelling Typologies

Housing policy, standards, and design guides have historically reinforced cultural preferences for dwelling typologies, for example, the terraced house. Dwelling typologies have a specific relationship between the scale of the unit, the building, and its surrounding context and to access and circulation types. They are therefore not only determining the housing interior and its use but also the urban scale and its morphology. The transformation of dwelling typologies highlights the relationship between their layouts and a variety of social, cultural, economic, historical, technical, political, and environmental contexts. Different occupancies, building conversions, new use patterns, and user adaptations had a significant influence on dwelling layouts.

- Social transformations, especially in the post-war period, saw spatial hierarchy and organisation no longer shaped by social norms and aspirations but increasingly by considerations of efficiency, convenience, privacy and affordability. This affected the type of rooms provided in a home, for example, a parlour, the adoption of new types of circulation spaces such as corridors and access galleries, and the reorganisation of 'public' living spaces and 'private' bedrooms.
- Modern utilities and appliances in the home had a significant impact on its spatial and functional organisation, for example, the rearrangement of kitchens, WCs, and bathrooms.
- There has been a change from the standardisation of dwelling typologies to the standardisation of rooms and elements within the home.
- There has been a shift from building two- and three-storey dwellings such as terraced and semi-detached houses to single-storey dwellings such as flats, both historically and in terms of location within the city. Today flats account for over 54% of London's housing stock while terraced housing, once the predominant housing type, now constitutes a mere 25.9%.
- The increase of flats in London has also been the result of many conversions of terraced housing. This terraced-house-flat hybrid demonstrates the unreliability of conventional housing typologies, as dwellings and their classification and function can change over time – from a house to a flat.

Dwelling Morphology

Morphological criteria are more commonly used in regulatory instruments due to the ability to generalise common formal aspects in contrast to typological classifications or property types that can be socio-culturally defined. A morphological analysis provides a more direct evaluation of housing design criteria and is essential to analysing functional requirements at the dwelling scale.

- Compliance with minimum space standards is not always an indicator of housing quality. Floor plans with a low compactness ratio can meet space standards without providing the intended usability.
- The overall size of a dwelling is mostly determined by its kitchen, dining, and living areas while bedroom sizes are comparably constant.
- There is a trend towards less elongated plans in single-storey dwellings, resulting from changing preferences in building typologies and unit layouts in London.
- Dwelling footprints have become more compact over time and there has been an increase in the short-side to long side ratio. This demonstrates that typological changes are directly represented by morphological changes.
- How a building is accessed ultimately defines its disposition at the scale of both the individual unit and the wider urban context.

Introduction

London's population is growing nearly twice the rate of the average city in the UK.¹ This growth, together with a rising ageing population and changing demographics, has led to a crisis of unaffordable, insecure or unsuitable housing. Despite its severity – with Great Britain alone needing an estimated 380,000 new homes per year – there is a lack of consistent, reliable data on existing dwelling interiors.² How are they designed, what are their standards, spatial characteristics, and use? In fact, we do not know much about how the average home looks like.

The way we design and build housing has seen surprisingly little innovation over the last 100 years. Although its importance to everyday life and wellbeing, housing and its design and procurement are dominated by economic considerations. Housing is one of the most resilient and largest but also conservative forms of investment. With people in the UK like other Europeans spending about 90% of their time indoors, of which 60% is at home, this research studies the home interior in which we spend most of our daily lives.³ We compare how housing standards, organisation, and dimensions have changed over time, and study their effect specifically on London's built environment. This will demonstrate how housing policy, regulations, and dwelling typologies are closely related, shaping how we live today.

Housing design as a consequence of social and cultural transformations, technological advances, and space standards and building regulations raises an important question about how housing quality is defined by different stakeholders and at different times. A historical analysis of housing policy and design reveals the instrumental role that housing space standards have played in defining this quality of housing in England. But it also reveals the problem of using quantitative measures to assess housing quality. This problem has to be seen in the context of a shift in focus from qualitative to quantitative criteria in the assessment of housing outcomes, which is directly

1.
Between 2006 and 2016, its population grew by 1.2 million (15.4%).

2.
Glen Bramley, *Housing Supply Requirements across Great Britain: For Low Income Households and Homeless People* (London: Crisis & London Housing Federation, 2017), p. 6.

3.
Dimosthenis A Sarigiannis, *Combined or Multiple Exposure to Health Stressors in Indoor Built Environments* (Bonn, Germany: WHO Regional Office for Europe, 2013), p. 9.

linked to a change in the role of the state in housing provision and regulation. A change in the nomenclature of state-supported and subsidised housing is thereby revealing: from more widely accessible ‘public’ housing in a post-war social welfare state to ‘social’ housing after the wholesale privatisation of housing in the 1980s to today’s ‘affordable’ housing, acknowledging a systematic financialisation of housing. This leads us to the question of what drivers and evidence base determine housing policy and design, and how are these related to how we live, measure or define housing quality?

By studying the size and spatial organisation of dwellings, we examine the design of housing from a historical perspective and analyse what kinds of evidence-based spatial judgments exist. We thereby compare qualitative and quantitative drivers of housing and its design. We also explore the value of machine learning to the dimensional and morphological analysis of housing. We ask, if this quantitative approach challenges or supports commonly held assumptions and hypotheses and if this can generate new spatial insight or alternative definitions of housing quality on which to ground discussions of policy, standards, and the design of housing?

Housing in the UK: Shrinking Houses, Shrinking Standards?

Exponential population growth and industrialisation during the Victorian era and a rapid expansion since World War I brought a unique urban form to London as well as major spatial transformations. Today, 56% of the London housing stock dates from before 1945.⁴ However, the majority (79%) of homes across England are near or below the minimum acceptable space standard when compared against the *London Housing Design Guide* of 2010 according to some research.⁵ At the same time, the Greater London Authority claims that homes built in London in the last four years, with an average floor area of 77 m², are larger than dwellings built between the 1940s and 1960s but smaller than pre-war homes.⁶

In 2005, the think tanks Policy Exchange and Localis found that the UK had some of the smallest new-built homes compared to Western Europe.⁷ They attributed this to rising land prices that have increased in the UK faster than in Western Europe, Japan, Switzerland or the United States.⁸ The average size of new-built dwellings in the UK is 76 m², compared to the housing stock’s overall average of 85 m². This is substantially lower than in other countries, for example, new-built homes in Ireland are often up to 15% bigger. Homes in the UK have in comparison to other European countries more rooms (4.8 rooms per dwelling average for new-built), an indication that the UK housing market prefers properties with more bedrooms or separate living and dining spaces. Consequently, the average room size in new dwellings – just over 15 m² – is lower than in other European countries. A study by

4. Compared to the UK average of 38.5% built before 1945. See, Valuation Office Agency, ‘Dwellings by Property Build Period and Type, LSOA and MSOA’. London Datastore <<https://data.london.gov.uk/dataset/property-build-period-lso>> [accessed 11 March 2020].

5. Malcolm Morgan and Heather Cruickshank, ‘Quantifying the Extent of Space Shortages: English Dwellings’, *Building Research & Information*, 42.6 (2014), p. 713.

6. James Gleeson and Georgie Cosh, *Housing in London 2019: The Evidence Base for the Mayor’s Housing Strategy* (London: Greater London Authority, 2019), p. 39.

7. Alan W Evans and Oliver Marc Hartwich, *Unaffordable Housing: Fables and Myths* (London: Policy Exchange Ltd, 2005), p. 9.

8. The rate of increase in the UK is about 2.5% per annum compared to an average increase of 1.1% for Europe. Ibid, p. 24.

Valerie Karn and Linda Sheridan in 1994 found a continuing increase in two-bedroom 4-person properties, however, 58.1% of their sample two-bedroom units could only accommodate 3 bed spaces (with only the larger bedroom typically having a size of more than 9 m²).⁹ This suggests that properties advertised for four people would be too small if fully occupied.¹⁰ Karn and Sheridan thus identified that in both the private and housing association sectors, new-built dwellings were 5% to 15% below the Parker Morris space standard of 1961.

Like the housing stock, space standards have changed over time. While the overall dwelling size has seen an increase in space standards, that of bedrooms has been significantly reduced. In the *Tudor Walters Report* (1918), for example, a 3-bedroom 6-person house was no less than 73.5 m², compared to 102 m² in the *Nationally Described Space Standards* (2015). The former, however, proposed that main bedrooms be at least 14.9 m², while the latter suggests a mere 11.5 m².

The wide range of research on housing includes studies on the benefits of well-designed spaces in homes – or the adverse effect of low-quality housing – and the regulations needed to ensure that minimum requirements are met. For example, in 2005, the housing charity Shelter surveyed 505 households in ‘overcrowded’ dwellings and found that 77% of the respondents agreed that the quality of domestic space they live in determines the quality of their family relationships.¹¹ This evidences the importance of housing in providing privacy, reducing depression and anxiety, and allowing healthy child development.

The Covid-19 pandemic has increased awareness of housing issues. During the first Covid-19 lockdown, nearly 31% of adults in Britain experienced mental or physical health problems due to their housing conditions, with more than 10% feeling depressed because of a lack of space at home.¹² Covid-19 is forcing a reassessment of what we expect from, or how we use, design, and regulate homes. This is challenging current understandings of domesticity and the division of places for living, working, and learning – all now taking place at home. But the need for new types of housing already emerged earlier with demographic shifts, including that towards an ageing society (around 20% of the UK population is aged 65 and above) and the demise of the traditional nuclear family, with married couples living with dependent children representing only 17.75% of all households in the UK in 2019.¹³ The pandemic is merely accelerating a misfit between housing provision and needs by adding to growing pressure to design homes and neighbourhoods capable of accommodating changing lifestyles and use. Importantly, current transformations exacerbate existing housing inequalities. Covid-19 has already evidently changed housing expectations. Those who can afford to, are moving out of cities into larger properties – 34%

9. Valerie A Karn and Linda Sheridan, *New Homes in the 1990s: A Study of Design, Space and Amenity in Housing Association and Private Sector Production* (York: Joseph Rowntree Foundation and the University of Manchester, 1994), p. 37.

10. Greater London Authority and HATC, *Housing Space Standards: A Report by HATC Limited for the Greater London Authority* (London: Greater London Authority, 2006), p. 110.

11. Liam Reynolds, *Full House? How Overcrowded Housing Affects Families* (London: Shelter, 2005), p. 8.

12. National Housing Federation, *Housing issues during lockdown: Health, space and overcrowding* (2020).

13. Office for National Statistics, Labour Force Survey (2019).

14. Hamptons International, *Tenants join the space race: August 2020 Lettings Index*, (2020).

15. CABE, *Improving the Design of Housing. What role for standards?* (London: CABE, 2010).

16. CABE, *Space in New Homes: What Residents Think* (London: CABE, 2009), p. 4.

17. Department for Communities and Local Government, *Housing Standards Review: Consultation* (London: Department for Communities and Local Government, 2013), p. 7.

of tenants who relocated between May to August 2020 in Great Britain paid on average 23% more in rent for an additional 1.4 bedrooms in comparison to their previous home.¹⁴ There is also an increased demand in shared living by couples and the elderly seeking to live in a social ‘support bubble’. Existing assumptions around housing needs, affordability, and quality are reproducing conventional homes often seen by the public as no longer fit for purpose.

Yet, housing design has consistently underdelivered. A housing audit by the Commission for Architecture and the Built Environment (CABE) in 2009–2010 revealed that almost one-third of homes are so poorly designed that they should not have been granted planning permission.¹⁵ Their survey *Space in New Homes: What Residents Think* (2009), looked at the level of satisfaction among those living in private sector homes built in Greater London since 2002. They found family homes without play areas or windows overlooking blank walls. While occupants showed overall satisfaction with the design and layout of their homes, they would prefer more flexible and adaptable rooms that can be used for multiple purposes.¹⁶

Standard versus Regulation

Regulations and standards are distinctly different in terms of their purpose and impact on housing design. Whereas building regulations in the UK are exclusively produced by government bodies and mandatory, space standards are often not. For example, minimum internal floor areas are currently considered by London’s local authorities as part of determining planning applications – but the adoption of certain housing standards is not nationally regulated and voluntary, unless subject to financial support or specific development conditions by local authorities, government bodies or housing associations. Housebuilders can be incentivised to meet them as ‘good practice’. Standards therefore typically set out more subjective issues, such as specific design characteristics. As the 2013 consultation for the *Nationally Described Space Standards* (NDSS) made clear, standards are rarely subject to cost-benefit analysis, unlike regulations.¹⁷ However, standards often overlap with areas of regulations and as both are usually produced in isolation from each other, which can cause contradictions.

Key housing regulations, such as those found in the Approved Documents of the Building Regulations, largely deal with health and safety issues and have been introduced to protect occupants and users from the hazards of fire, poor sanitation, the risk from falling or structural failure. That said, regulations have evolved over the last two decades to include, for example, concerns around energy consumption, sound insulation, and accessibility, design issues that are significant to an occupant’s wellbeing and environmental sustainability but not considered life-threatening.

Over the past 30 years, London's housing has seen significant and far-reaching deregulation, starting with the Right to Buy Act 1980 and the subsequent privatisation of the public housing stock and financialisation of housing in general. In the early 1990s, only 2% of housing association homes met the Parker Morris storage standards and a third had insufficient space for people to sit down and eat together.¹⁸ Housing associations and advocates of minority groups have since urged for more regulation of housing.¹⁹ While space standards have historically differentiated between public and private sector housing, its tenure does not always remain the same. For example, council housing can be sold and privatised. Like other space standards, the Parker Morris standards in the 1960s was only mandatory for council housing (until 1980) and shied away from even including private sector housing in its recommendations. Commenting on the small dimensions of private enterprise homes, the report stated that 'they offer one way of meeting the needs of small families [...] but of course, for reasons of neighbourhood balance, not too many of them should be built in any one place'.

But regulations and legal housing standards do not guarantee good housing design or high-quality homes. Standards are often a product of their time and informed by cultural perceptions around space and assumptions of how domestic space is used at the time. As Julia Park notes, what we deem as 'enough space' is influenced by 'cultural norms, the people we know, our personal and family background, our expectations, lifestyle, age and many other factors.'²⁰ With shrinking homes and space standards, there have been repeated calls over the past decades, to return to the Parker Morris housing standard. Unlike preceding standards, it determined the space needed in homes according to usability criteria.²¹ But is the use of Parker Morris space standard still appropriate today? Andrew Drury of the Housing Association Training & Consultancy (HATC) points out that they reflect how people used their home at the time in the 1960s, but there is lacking up-to-date data to evaluate if they are still applicable.²²

Policies and Typologies

Housing regulations in the UK have a long history of several hundred years and have a direct impact on the provision and design of housing. While how we live has influenced housing design and standards, they have in turn shaped the way we live. Housing standards have privileged housing typologies that represent 'current' modes of living and design preferences. Thus, housing typologies and their morphological aspects can be indicative of the building regulations of the time and their social, cultural, and economic drivers. For example, the hearth tax returns of the 1660s reveal the sizes of homes, with the number of hearths per dwelling a fair indicator

18. Valerie Karn, 'Housing Standards', in *Housing – Today and Tomorrow* (2nd Supplement to the Guide to Housing), ed. by. M Smith (London: Housing Centre Trust, 1995), p. 111.

19. Ruth Madigan and Joanne Milner, 'Access for All: Housing Design and the Disability Discrimination Act 1995', *Critical Social Policy*, 19.60 (1999), p. 396.

20. Julia Park, *One Hundred Years of Housing Space Standards: What Now?* (Levitt Bernstein, 2017), p. 59.

21. It considered the size of furniture needed in each room for typical daily routines, including the space required to move this furniture.

22. Andrew Drury, 'Parker Morris – Holy Grail or Wholly Misguided?', *Town & Country Planning Association Journal*, 77.10 (October 2008), p. 403.

23.
Vanessa Harding and Philip Baker, *People in Place: Families, Households and Housing in Early Modern London* (London: Centre for Metropolitan History, Institute of Historical Research, 2008), p. 28.

24.
Stefan Muthesius, *The English Terraced House* (New Haven: Yale University Press, 1982), p. 5.

25.
Ibid., p. 4.

of relative size and spaciousness.²³ Another example is the window tax that was levied on homeowners from 1696 to 1851. The amount of tax paid was directly proportional to the windows on a property's facade, causing many homeowners to 'brick up' windows to reduce their tax payments. But as Stefan Muthesius points out, building regulations and building typologies are often difficult 'to disentangle in terms of cause and effect'.²⁴ He emphasises how housing regulations and standardisation of plans and building processes were major drivers in the proliferation of terraced housing.²⁵

While certain housing policies have come after social, economic, or political turning points, and as a consequence are aimed at solving immediate problems, others have been developed as preventive measures. This can be traced back to the Housing Act of 1774 that introduced strict fire regulations following the Great London Fire of 1666. Similarly, such is the case with the *Tudor Walters Report* (1918) or the *Dudley Report* (1944), written to address the housing shortage caused by World War I and II.

Our study shows that the morphological characteristics of dwellings are instrumental in analysing and classifying housing. Dimensional characteristics of dwellings are closely related to the shape of building typologies but also provide a classification of dwellings outside conventional typological conventions, which is commonly used in housing regulations. While a typological and morphological analysis provides a good comparison of formal transformations over time, it is less suited to analysing the underlying social transformations, and both need to be considered to evaluate spatial configuration against use. This leads us to inquire to what extent a quantitative and dimensional analysis of housing can provide better evidence into the connection between housing design and space standards.

One of the key research questions guiding this housing study is whether new kinds of evidence will produce a new kind of judgement for housing and its design. This question is explored in the following three chapters of this report: Chapter 1 – 'Policy and Regulation', Chapter 2 – 'Housing Typologies', and Chapter 3 – 'Dimensional Data Analysis'.

Chapter 1 is a chronological survey of housing design policies and aims in relation to the different policy instruments used to implement them. By reviewing the relevant grey literature, housing acts, and design manuals in addition to secondary literature, it traces the shift of policy instruments from 1774 until today. Thereby a change in focus from general public health to specific design problems linked to space standards and home use to more recent concerns with less tangible issues such as sustainability or social value is evident.

Chapter 2 examines the interior organisation of dwellings and changes in housing design in relationship to sociocultural, economic, political, and environmental transformations with an immediate effect on the typical household definition and home use. It investigates the connection between cultural and economic preferences for housing typologies and housing design regulations. This chapter uses a case study-based approach to the analysis of housing outcomes typical for key periods, housing policies, and policy instruments identified in Chapter 1. The case studies are discussed according to a typo-morphological classification of housing. This reveals a close interplay between socio-political and economic drivers of housing and sociocultural expectations of housing that in turn influence housing organisation and the appearance, design, and regulation of homes.

Chapter 3 is a data-based dimensional and statistical analysis of London's existing housing stock in relationship to space standards. Based on a study of over 5,000 floor plans, it evaluates the effectiveness of space standards and morphological classification to assess the quality of housing, but also to understand how this definition of quality has changed over time and how different housing or dwelling typologies relate to this.

What these three chapters highlight is that the question of housing design and its evaluation from a policy, market, or user perspective cannot be sufficiently answered without taking into greater account the qualitative values of housing and the individual experiences and use of the home by its inhabitants. While regulations and policies tend to generalise housing needs and usage, the quality of housing, whether measured in quantifiable or in qualitative terms, often does not fit into this generalisation and standards.

Therefore, while design governance is based on quantifiable evidence and research, further qualitative research is needed to establish the effectiveness of current regulations and standards in relation to user needs, lived experience, housing quality, and wellbeing. Our ongoing research looks into the use and perception of domestic interiors in the UK and how this can better inform design decisions and housing quality debates.






Chapter I: Policy and Regulations

Chapter 1 of this study into how quantitative and qualitative factors inform housing design, examines key moments in the formation of housing policies, regulations, and design guidelines in the United Kingdom, and their impact on the provision of housing in London from 1714 to the present-day. It demonstrates how new standards have responded to poor housing conditions, shortages, and various changing economic and socio-political factors. Furthermore, it explores the impact of these standards on space and its design within the home, while highlighting shifts in government involvement and other bodies or institutions that have been key to housing provision within London. These historical developments situate the meaning, logic, and function of standards today.

Timeline

The following timeline contextualises selected case study housing standards and regulations – including standardised plans detailed within these – with built examples of housing in London, and political/institutional bodies of relevance. This timeline is thereby included as a visual aid that draws together historical developments within this field of enquiry and the various sections that make up this study. Its presentation of wider social, political, and economic measures allows for a deeper, more informed understanding of housing in London and its historic development.

Note: Timeline plans are not presented at a specific scale, but are sized relative to one-another.

- Key :
-  Acts
 -  London Plans
 -  Reports
 -  Manuals
 -  Standards

STYLE /PERIOD

1740

1760

1820

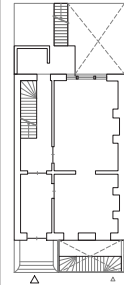
1840

1850

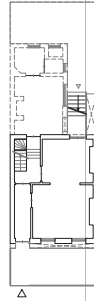
GEORGIAN

REGENCY

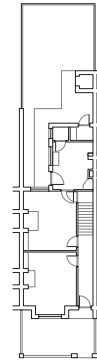
BUILT HOUSING EXAMPLES



Terrace House
1789, Gower Street



Terrace House
1815, Edward Estate

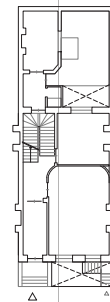


3rd class Terrace House,
1815, Noel Park



Terrace House
1840, Turlou Square

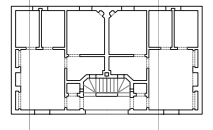
STANDARDISED REPORT/MANUAL PLANS



2nd Rate Terrace House



3rd Rate Terrace House



Society for Improving the Living Conditions
of the Labouring Classes
1850, Henry Roberts

GOVERNMENTS, BODIES, ACTS, MANUALS & REPORTS



Building Act, 1774



Use of Pattern Books



Shaftesbury Act, 1851

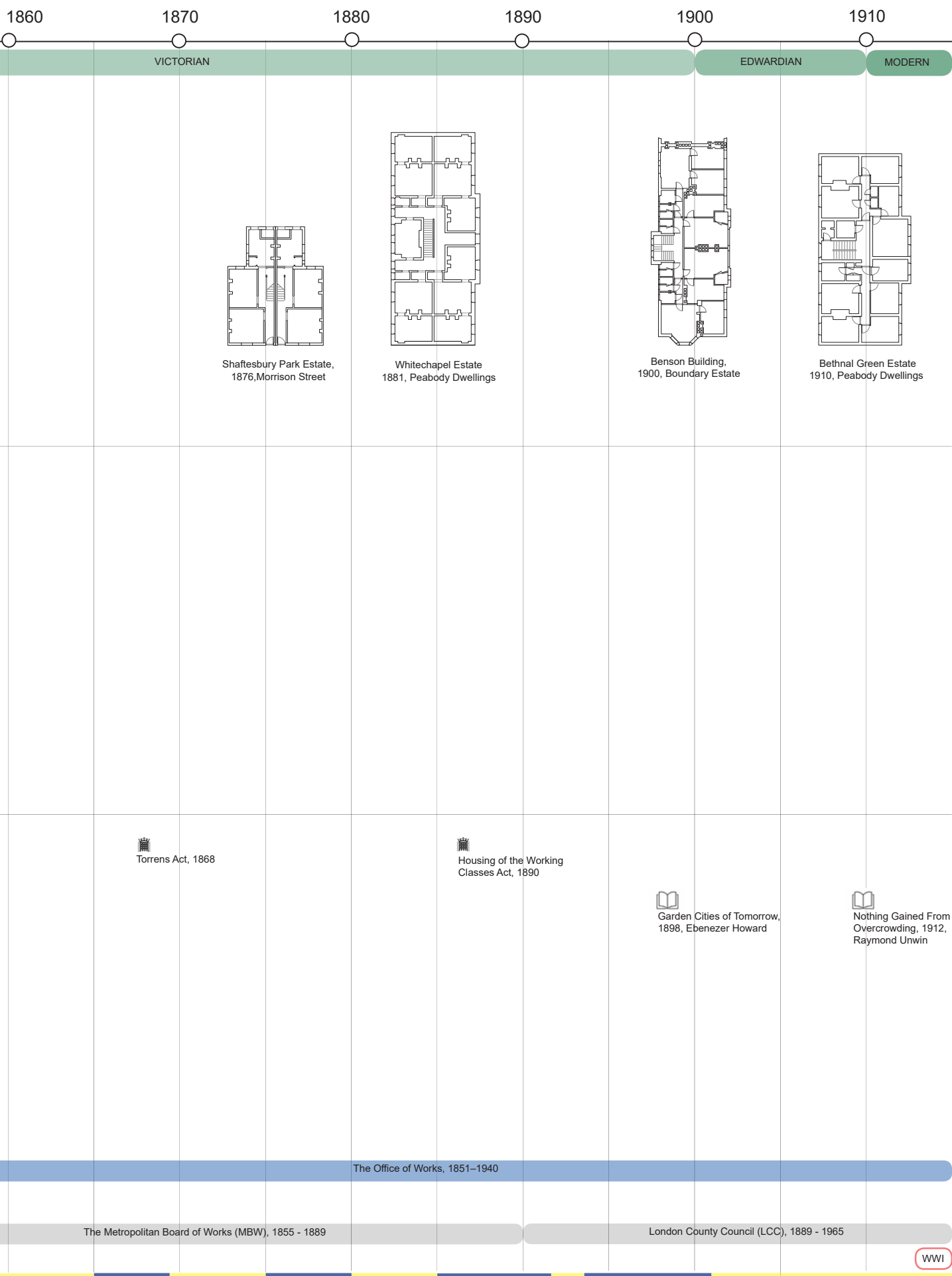


Society for Improving the Living
Conditions of the Labouring Classes,
1850, Raymond Unwin

Metropolitan Buildings
Office, 1845 - 1855

WHIG/LIBERAL

CONSERVATIVE



STYLE / PERIOD

1920

1930

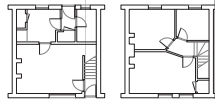
1940

1950

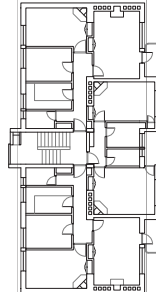
1960

Modern

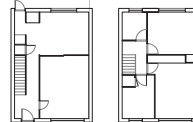
BUILT HOUSING EXAMPLES



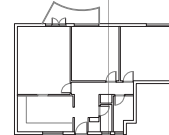
Chapel House Estate,
1921, Poplar



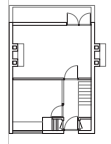
Loughborough Park Estate,
1938, LCC, Brixton



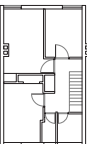
Terraced house, 1947
Somerford Grove



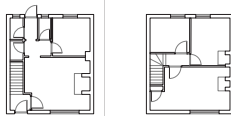
2 Bedroom flat
1958, Hallfield Estate



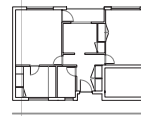
Maisonettes Canada Estate,
1962, Neptune Street
Bermondsey



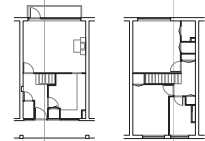
STANDARDISED REPORT/MANUAL PLANS



3 Bedroom Manual flat
1918, Tudor Walters Report



2 Bedroom flat,
1944 Housing Manual



Maisonettes
1956, LCC Housing Type Plans

GOVERNMENTS, BODIES, ACTS & REPORTS

Addison Act, 1919

Tudor Walters Report, 1918

Housing (Temporary Accommodation) Act, 1919

Dudley Report, 1944

1944/49 Housing
Manual

County of London Plan (Abercrombie Plan), 1943

Greater London Plan, 1944

Parker Morris Report, 1961

Generic Plans,
1965

Design
Bulletin 6,
1968

Ministry of Reconstruction 1917-1919

Ministry of Reconstruction II 1943-1945

Ministry of Housing and Local Government, 1951-1970

The Office of Works, 1851-1940

Ministry of Works and Buildings, 1940-1942

Ministry of Works, 1943-1962

Ministry of Works and Planning, 1942-1943

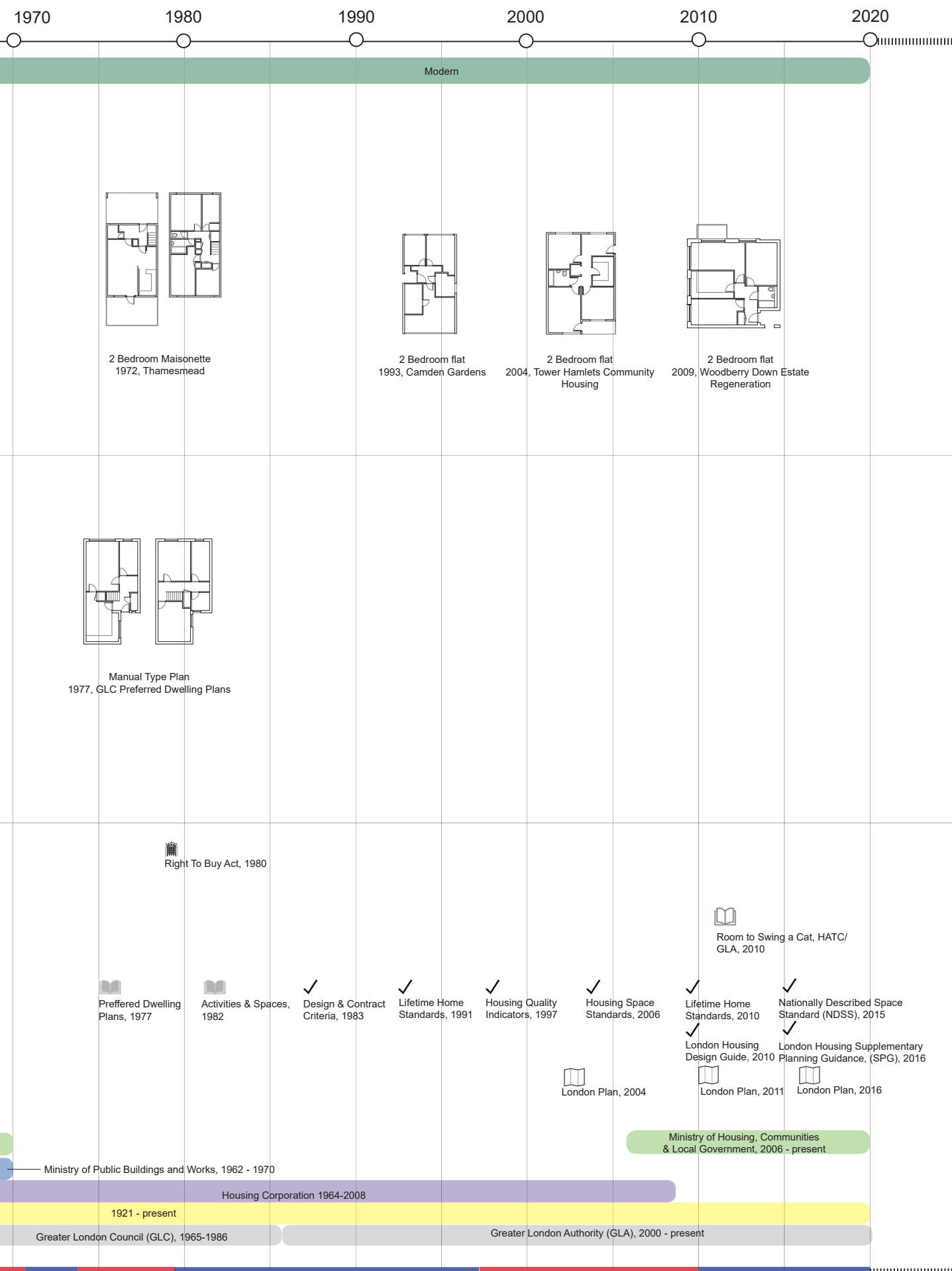
Building Research Establishment

London County Council (LCC), 1889 - 1965

WWI

WWII

LABOUR



Plans

All plans within this report are presented at scale 1:200 - unless otherwise stated.
They are labelled accordingly:

- B (Bedroom)
- b (Bathroom)
- D (Dining Room)
- K (Kitchen)
- L (Living Room)
- P (Parlour)
- S (Scullery)

Maps

This section includes a series of maps that illustrate the historical growth of London between 1900 and 2015. This data is based on the Valuation Office Agency's records of council tax bands and was obtained through the Consumer Data Research Centre. Residential dwellings are grouped into approximately 10-year age bands.

Consumer Data Research Centre data set:

<https://data.cdrc.ac.uk/dataset/house-ages-and-prices/resource/4f1956b2-3128-4297-ba97-059e1fbc1fcc>

The Digital Vector Boundaries for built-up area sub-divisions in England and Wales were taken from the Office for National Statistics's Open Geography Portal:

<https://geoportal.statistics.gov.uk/datasets/built-up-area-sub-divisions-december-2011-boundaries?geometry=-0.156%2C51.500%2C-0.087%2C51.519>

1714 - 1830

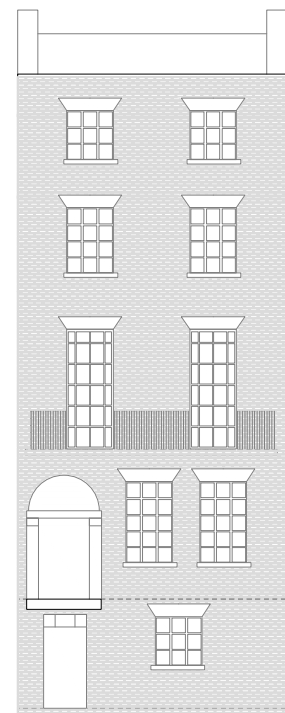
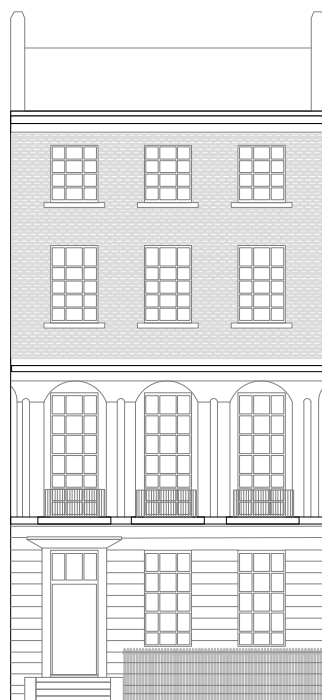
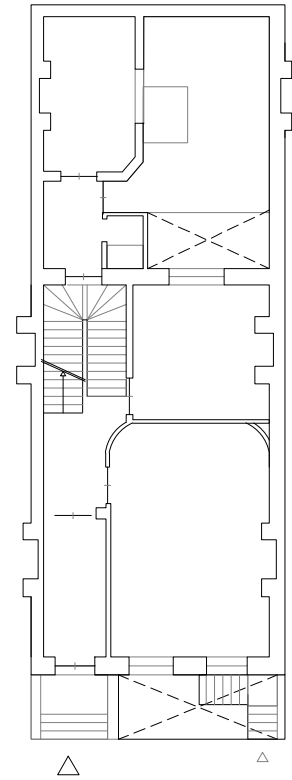
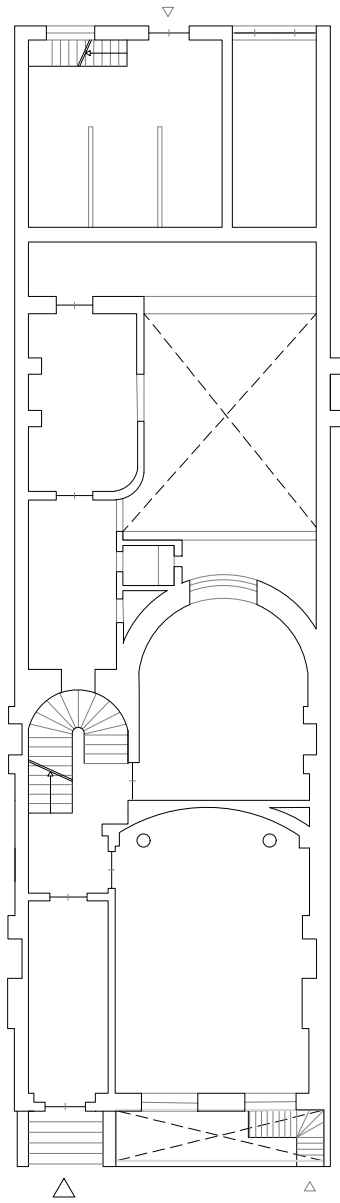
Georgian London: Pattern Books and The 1774 Building Act

During the seventeenth and eighteenth-century, the townhouse became a common inner-city residence for London's upper class. Housing was built speculatively, and the Georgian terraced housing streets this created can be regarded as the beginning of large-scale urban development within London. Building regulations and housing manuals during this period led to a widespread standardisation of housing design through a cost-driven approach, emphasising the importance of stylistic and architectural elements.

With increasing urban growth, the government sought to better regulate housing construction, first visible in the planning and development of areas such as Grosvenor Square, Queen Anne Square, and Soho Square. The Building Act of 1774 – still partially valid today and written by architects Robert Taylor and George Dance – was introduced to control the quality of construction and reduce fire spread and hazards.¹ The act classified houses according to 'rates', their annual ground rent value based on the building footprint, which was used to determine their level of taxation (Fig. 1).² The act also regulated building materials, the structural requirements of foundations and external party walls, and fire compartmentation. Moreover, it established that all building work across the Cities of London and Westminster, Southwark and the Parishes of St Marylebone, Paddington, St

1.
The 1774 Building Act still regulates the construction of fireplaces.

2.
The Building Act created a rating system that would value buildings based on the floor area of the ground floor: 1st rate (850 £) > 84m²; 2nd rate (350 - 850£) 46-84m²; 3rd rate (150 - 300£) 33-46m²; 4th rate (<150£) > 33m²



First Rate Terraced House

Second Rate Terraced House

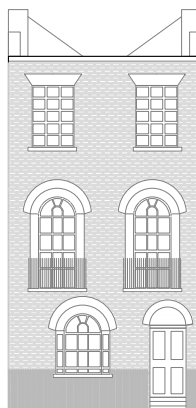
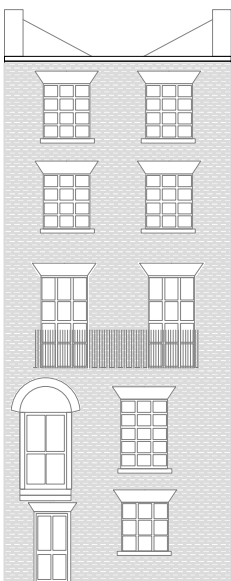
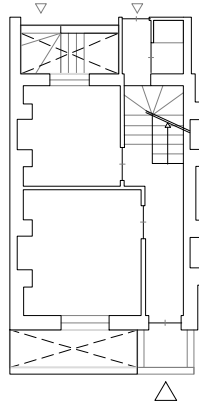
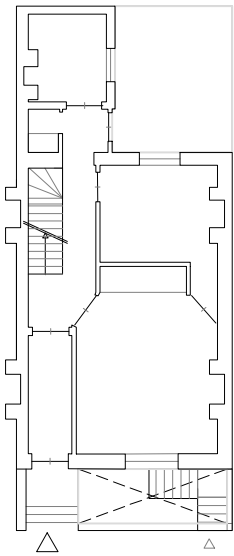
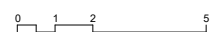


Fig. 1
Elevation and Ground Floor Plan
Terraced Houses
Peter Nicholson, *The Builder's and
Workman's New Director*, 1834

Redrawn by Gianna Bottema



Third Rate Terraced House

Fourth Rate Terraced House

Pancras, and St Luke in Chelsea should be controlled by statutory district surveyors, a body constituted by an assembly of architects and politicians who made decisions on the development of estates and assessed building rates.

The Building Act 1774 effectively limited the variation of housing plans and supported the drive by speculative builders to maximise saleable floor areas, dwelling numbers, and profit. The typical Georgian terrace house was long and narrow, as this made the use of land, building materials, and labour more cost-efficient for speculative builders. This drive for efficiency also led to the publication of pattern books for developers, architects, and master builders that helped disseminate standardised designs for structural, architectural, and decorative building elements.³ Simultaneously educational and practical, these manuals provided standard construction details and information on how to calculate building quantities. Whereas earlier illustrated architectural books in England were greatly influenced by the aesthetics and proportions of classical Roman architects such as Andrea Palladio and Vitruvius, pattern books published after the Building Act 1774 were pragmatic and promoted the use of measurement and calculation in construction, as well as standardised designs.

During the Georgian period, there were several ways of disposing land for building and beginning the speculative development process. In many parts of London, estates were normally held in a trust and its land would remain within families over several generations. The estates usually laid out the streets and their sewers. Plots would then be let on long leases, first for as little as 33 years, but by the end of the Georgian era, leaseholds were commonly increased to 99 years. The main developer would take a lease from the landowner (freeholder) and could sublease individual plots to smaller developers or builders. These developers were often tradesmen such as master builders, bricklayers or carpenters who would organise the different building trades during construction, with the building's design based on details found in pattern books.⁴ By 1800, it would become conventional for one firm to undertake the most essential parts of the construction, as opposed to the previous practice of putting up just the outer shell or 'carcass' and allowing each buyer to complete the building.⁵ When the lease expired, the land including any development by the leaseholder would return to the freeholder, who would often alter and refurbish the property to increase their market value before issuing a new lease. In some cases, the freeholder would let a property directly at a profitable rate.⁶

3.
'Pattern Books: Creating the Georgian Ideal', Knowledge, RIBA <<https://www.architecture.com/knowledge-and-resources/knowledge-landing-page/pattern-books-creating-the-georgian-ideal>> [accessed 14 January 2020].

4.
Steen Eiler Rasmussen, *London the Unique City* (Cambridge: The MIT Press, 1964), pp. 291-292.

5.
Stefan Muthesius, *The English Terraced House* (New Haven: Yale University Press, 1982), p. 21.

6.
S Muthesius, p. 21.

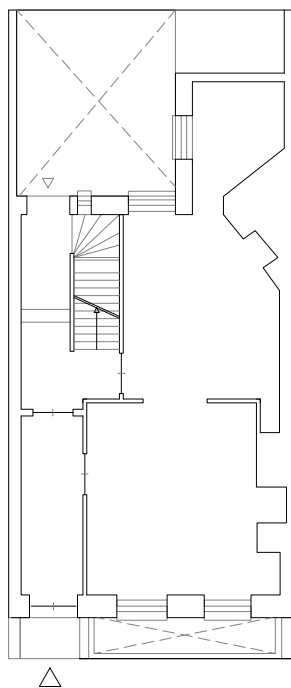


Fig.2
Ground Floor Plan
Terrace House, Meard Street, 1732

Redrawn by Gianna Bottema

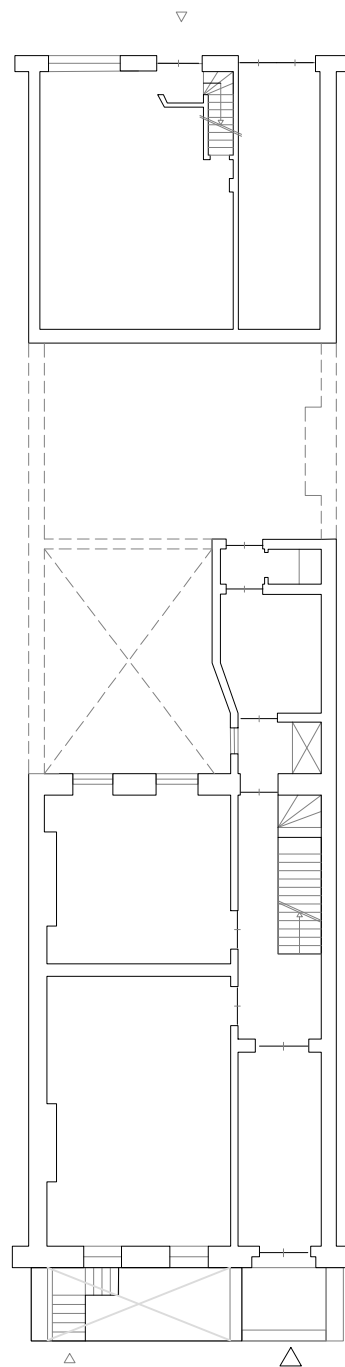
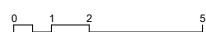


Fig.3
Ground Floor Plan
Terrace House, Devonshire Place, 1789

1837-1901

Victorian London: Metropolitan Building Act of 1844, Public Health Act of 1848, and Cross' Act of 1875



Spanning from 1837 to 1901, the Victorian era saw exponential population growth and increased production of housing. In contrast to the Georgian period, when the majority of property was owned by the upper class and wealthy landowners, housing built by the Victorians was increasingly for the growing middle and working classes. This led to an expansion of the suburbs. While the form of Georgian terraced housing was shaped by the economies of speculation, Victorian terraced housing in London was a response to changing demographics and housing needs.

Between 1841 and 1851, about 330,000 migrants moved to London (representing 17% of its population).⁷ London's rapid industrialisation and urbanisation created large areas of unsanitary slum housing (rookeries). These were made up of high-density cottages with one or two rooms, often

7. 46,000 came from Ireland fleeing famine.
Roy Porter, *London: A Social History* (Cambridge: Harvard University Press, 2001), p. 205.

8. Peter Malpass and Alan Murie, *Housing Policy and Practice* (Basingstoke: Palgrave, 2001), p. 29.

9. John Nelson Tarn, *Five Per Cent Philanthropy: An Account of Housing in Urban Areas Between 1840 and 1914* (Cambridge: Cambridge University Press, 1973), p. 15.

10. 'Chapter 12: Shaftesbury Park', Survey of London, English Heritage <https://www.ucl.ac.uk/bartlett/architecture/sites/bartlett/files/50.12_shaftesbury_park.pdf> [accessed 14 January 2020].

11. 'Noel Park', *The Builder*, 44.6 (30 June 1883), p. 874.

12. Charles Gatiff, 'On Improved Dwellings and their Beneficial Effect on Health and Morals, with Suggestions for their Extension', *Journal of the Statistical Society of London*, 38.1 (1875), p. 33-63.

13. Katy Chey, *Multi-Unit Housing in Urban Cities: From 1800 to Present Day* (New York: Routledge, 2018), p. 32.

14. Henry Roberts, *The Dwellings of the Labouring Classes* (London: Seeleys, 1850), p. 42.

15. S Muthesius, p. 135.

16. Ibid.

shared by more than one family. In response to the crisis, philanthropic housing trusts began to emerge during the 1840s under the sponsorship of Prince Albert.⁸ While philanthropic 'model dwelling companies' sought to improve housing conditions and provide homes for the working class, they did so for a competitive rate of return on investment – thus earning the name 'five per cent philanthropy'.⁹ Philanthropic housing companies such as the East End Dwellings Company and the Peabody Trust developed inner-city multi-storey tenements blocks and cottage flats, while others, primarily the Artizans', Labourers' and General Dwellings Company, built suburban cottages for workers along existing railway lines.

Built in 1876, the first major development by the Artizans', Labourers' & General Dwellings Company is Shaftesbury Park Estate in Battersea, a notable example of a new suburban cottage estate (Fig. 4). It was promoted as the Workmen's City and provided a viable solution to overcrowding in central London. Each family had its own small house, however, the estate was far from the city centre and travel was expensive. The suburban cottage estate differed from other, predominantly high-density and urban, model dwellings at the time. Shaftesbury Park was therefore widely discussed as a housing alternative.¹⁰ Another example by the Artizans Company is Noel Park in North London (Haringey). Completed in 1883, it was one of London's first distant commuter suburbs that adopted the typical suburban terraced housing typology (Fig. 5). Published in June 1883, *The Builder* noted that although Noel Park did not offer a particularly new arrangement, it provided 'the greatest accommodation at the cheapest rate'.¹¹

The first philanthropic ventures in central London were for tenements. Large tenement blocks would become the dominant typology by the late nineteenth-century for philanthropic companies, and by 1875, housed 32,435 people in over 6,000 dwellings (Figs. 7-8).¹² The design of tenement blocks was influenced by Henry Roberts' *Model Houses for Four Families*.¹³ Designed for the Great Exhibition of 1851 and built for the Society for Improving the Conditions of the Labouring Classes, Roberts had planned an efficient two-storey building capable of accommodating four families in self-contained flats in (Fig. 6). The design set basic new standards for the modern flat that have changed little since and catered for the needs of the working – often nuclear – family household. These standards are internal sanitation with running water and natural ventilation, and a division of functions by providing separate kitchen and living areas and, most importantly, separate bedrooms for parents as well as children of different sexes.¹⁴

Like Roberts, Banister Fletcher was interested in new housing solutions for the working classes. In his book *Model Houses for the Working Classes* of 1871, he developed a series of design alternatives, including two-storey houses whose exterior appeared like regular terraced housing but provided two self-contained flats with separate entrances (Fig. 9).¹⁵ These 'cottage flats' had separate kitchens and sinks but shared washing facilities in their common yard.¹⁶ Among others, this type of housing was built in London

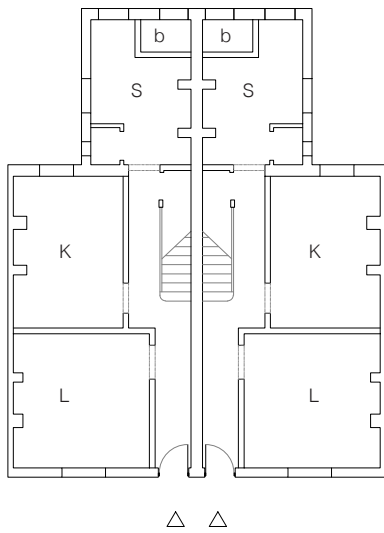


Fig.4
Ground Floor Plan
Terrace House, Shaftesbury Park Estate, 1876,
Artizans, Labourers & General Dwelling Company, William Austin

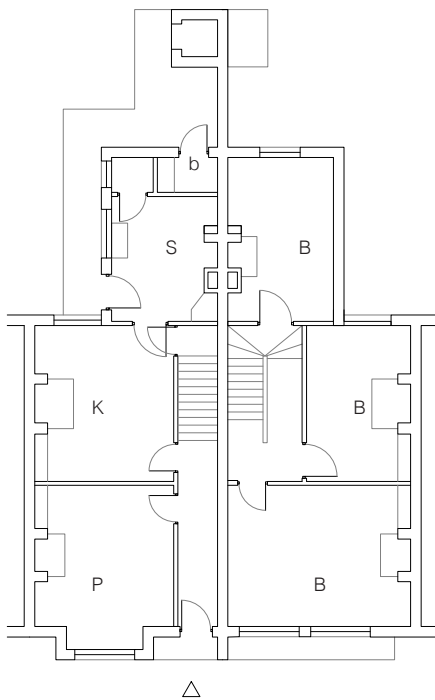
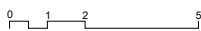


Fig.5
Ground and First Floor Plan
Third Class Terraced House, Noel Park, 1833,
Artizans, Labourers & General Dwelling Company, William Austin



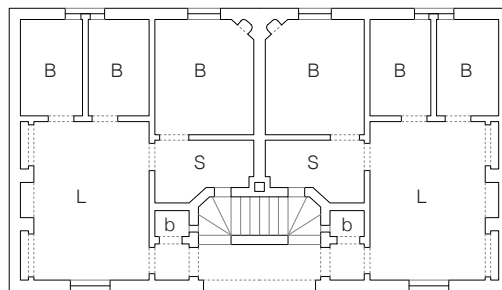
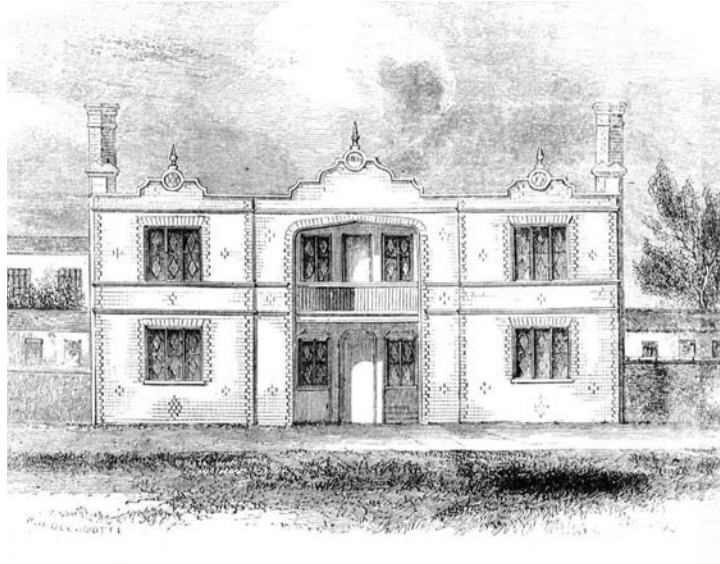
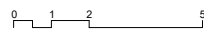


Fig.6
Plan and Elevation of Double House
Henry Roberts, Society for Improving the Conditions of the Working Classes, 1850



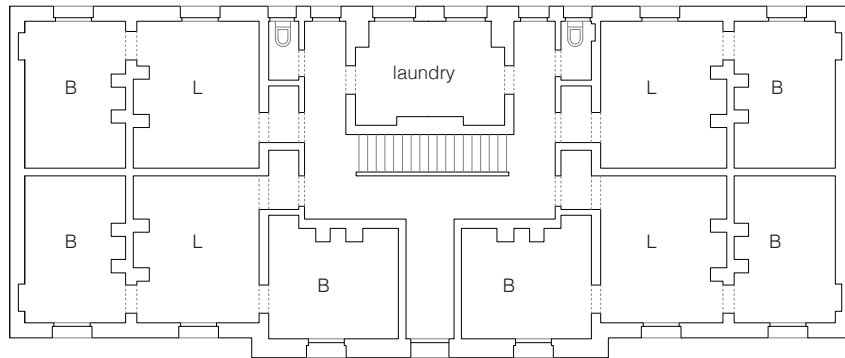


Fig.7
First Floor Plan
Whitechapel Estate, 1881,
Peabody Dwellings, Henry Astley Darbishire

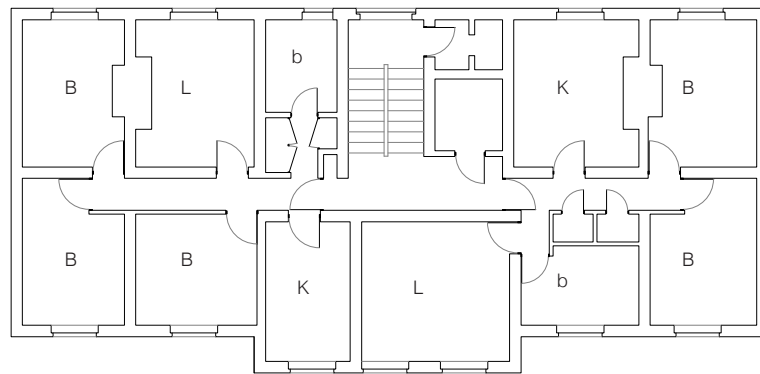
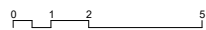


Fig.8
First Floor Plan
Bethnal Green Estate, 1910,
Peabody Dwellings, W E Wallis and Victor Wilkin



by the Peabody Donation Fund (established in 1862 and later renamed as Peabody Trust). Between 1864 and 1875, the trust appointed Henry Darbyshire to design their estates, with his first project completed at Spitalfields.¹⁷ Inspired by Roberts's model dwellings, he developed a standard plan that would be employed by the Peabody Trust over the coming 40 years.

17.
Henry Darbyshire had previously been commissioned by Angela Burdett-Coutts to build tenement housing at Columbia Square in Bethnal Green.

Despite progress in the supply of housing, living conditions were precarious and a great need to improve sanitary conditions persisted. Early Victorian statistics showed that poor sanitation and housing conditions were directly linked to high population mortality rates. To address this, around 400 Local Improvement Acts dealing with issues of sanitary control and building regulations were approved by parliament between 1800 and 1845.¹⁸ Constant changes and additions to legislation, however, made it difficult to enforce and monitor them, especially with the administration being fragmented across vestries, parishes, and councils. Richard Rodger attributes this failure to fully regulate building standards and resolve poor sanitation further to prevailing laissez-faire attitude, strong property rights, focus on profit, and increased housing cost caused by the bye-laws.¹⁹

18.
Richard Rodger, *Housing in Urban Britain 1780-1914* (Cambridge University Press, 1995), p. 26.

19.
Ibid.

An important improvement to sanitary conditions was made by the Metropolitan Building Act of 1844, which defined the height of buildings in relation to street width, sewage connections, and the open space provided behind each building. Also, district surveyors were given the responsibility previously held by estate surveyors. Estate surveyors often directly represented the interest of freeholders and would even develop parts of an estate and regulate the activities of builders themselves. In contrast, acting instead on behalf of local authorities, a district surveyor's sole role was to ensure that developments complied with the building regulations such as those linked to the thickness of walls, height of rooms, and design of chimneys and drains, and that building owners would maintain and repair their buildings.²⁰ With the English terraced house seen as exemplary abroad, Hermann Muthesius observes that legislation during these years was flexible and moderate, but demanding in sanitary matters.²¹

20.
The Metropolitan Building Act of 1844 stipulated that repairs could include the demolition of a wall or part of it, repairing or reinstating sewers or obstructed drain, and repairing chimneys tops and parapets.

21.
S Muthesius, p. 34.

Sanitation and public health concerns were major drivers of housing legislation. In response to the cholera epidemics, England passed its first Public Health Act in 1848. This was followed three years later by the Common Lodging Houses Act 1851 (Shaftesbury Act), considered one of the 'first comprehensive housing legislation.'²² The act gave local governments the power to directly intervene in the design and supply of housing, and set out the requirement to install sanitary facilities and limit the density and height of housing. Until 1868, the control of housing had been the responsibility of individual districts or vestries with limited powers to enforce necessary

22.
Leland S Burns and Leo Grebler, *The Housing of Nations* (London: Macmillan Press, 1977), p. 74.

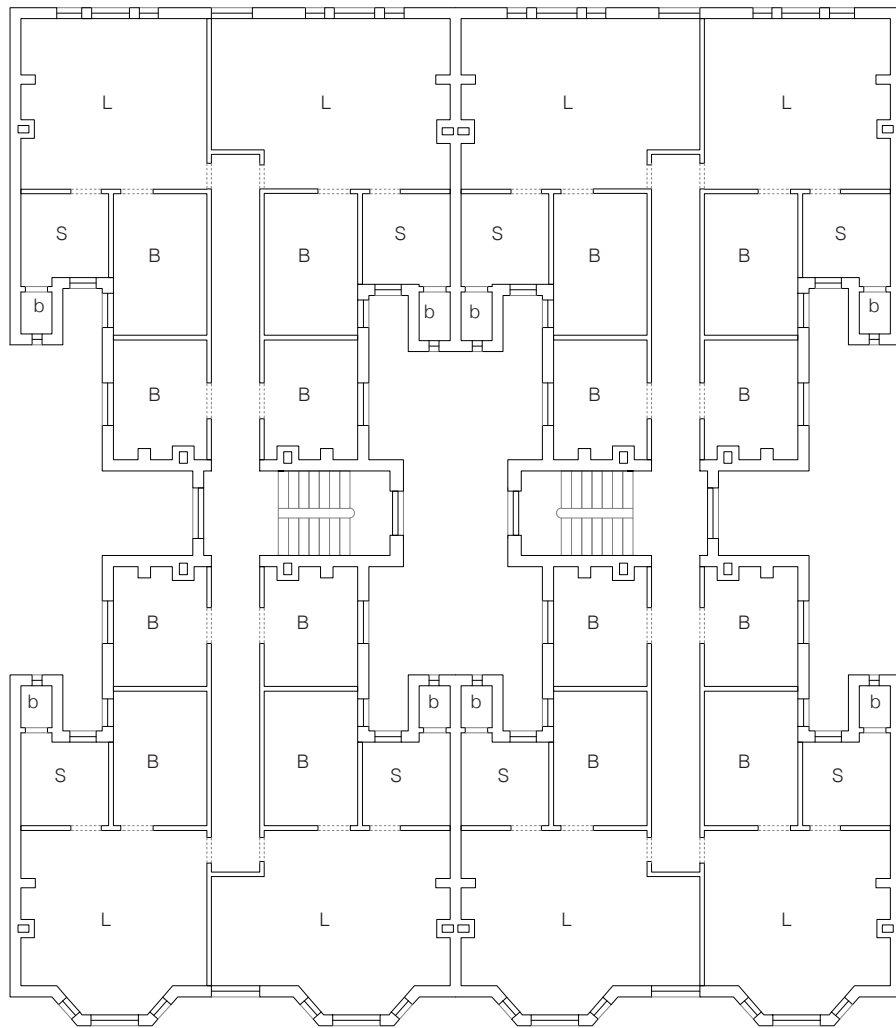
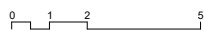


Fig.9
First Floor Plan
Banister Fletcher, Model Houses for the Industrial Classes, 1871



23.
A vestry boundary was associated with a parish, whereas a district was larger and included several parishes. All vestries and districts were incorporated within London boroughs by 1900.

24.
The slum clearance by the Metropolitan Board of Works displaced 22,868 people. Tarn, p. 83.

25.
'Housing and Town Planning Act 1919', Legislation, The National Archives <<http://www.legislation.gov.uk/ukpga/1919/35/enacted>> [accessed 4 March 2020].

26.
Porter, p. 234.

27.
Paul Barker, *Founders of the Welfare State* (Hants, England: Gower, 1986), p. 50.
The Hampstead Garden Suburb was developed by Henrietta Barnett in 1906. Raymond Unwin, the author of *Nothing Gained from Overcrowding* (1912), was appointed as the architect. See, Hugh J Gayler, *Geographical Excursions in London* (Lanham, MD: University Press of America, 1996), p. 176.

building improvements by their owners.²³ The Artizans' and Labourers' Dwellings Improvement Act of 1868 (Torrens Act) remedied this by making property owners responsible for the demolition or repair of unsanitary dwellings and obligating them to maintain a habitable standard.

In 1855, the Metropolitan Board of Works was established as a central governing body responsible for the provision of housing in London. Between 1875 and 1889, the board completed 16 slum clearance schemes under the new Artizans' and Labourers' Dwellings Improvement Act of 1875 (Cross' Act).²⁴ Slums were selected based on high mortality rates, with data collected and reported by Medical Officers of Health in each vestry or district, who played a key role in addressing public health issues. The reliance on this evidence to justify slum clearances, however, lacked sufficient assessment of the existing building stock and greater social problems underlying mortality rates.

Furthermore, the Housing of the Working Classes Act 1885, which was effectively a public health act, gave local authorities the power to clear slums and begin rehousing schemes. The subsequent Housing of the Working Classes Act 1890 further enabled local authorities to proactively purchase land and finance new housing. It also allowed for the exchange or sale of publicly owned land to create more coherent and large-scale housing strategies and plans.²⁵ Motivated by notions of social responsibility, this shift from public health acts to housing acts was an important transition in the history of social welfare and housing. The number of houses built by London's local authorities due to this new legislation began to exceed that by philanthropic organisations.

The Cheap Trains Act 1864 brought affordable fares to commuting workers and enabled philanthropic companies and speculative builders to develop new working-class suburbs near suburban railway stations. This is evident in North-east and East London in areas such as Tottenham, West Ham, and Leyton, but also Willesden.²⁶ The railway expansion both reinforced central London as a commercial centre and redefined suburbia. Paddington and Camden, which were formerly considered suburbs or extensions of the inner-city, were now replaced by outer suburbs such as Bromley, Croydon, and Walthamstow. These suburbs were significantly different and, like those designed by Norman Shaw from 1877 onwards, built in a new style of semi-detached houses in areas like Bedford Park. Considered the first garden suburb, Bedford Park boasted hot water plumbing and spacious design, and was influential on later developments such as the Hampstead Garden Suburb.²⁷ Although the semi-detached house as a housing typology had been in use since the 1850s, Bedford Park made significant changes to its organisation by introducing front gardens and eliminating service parlours and basements.

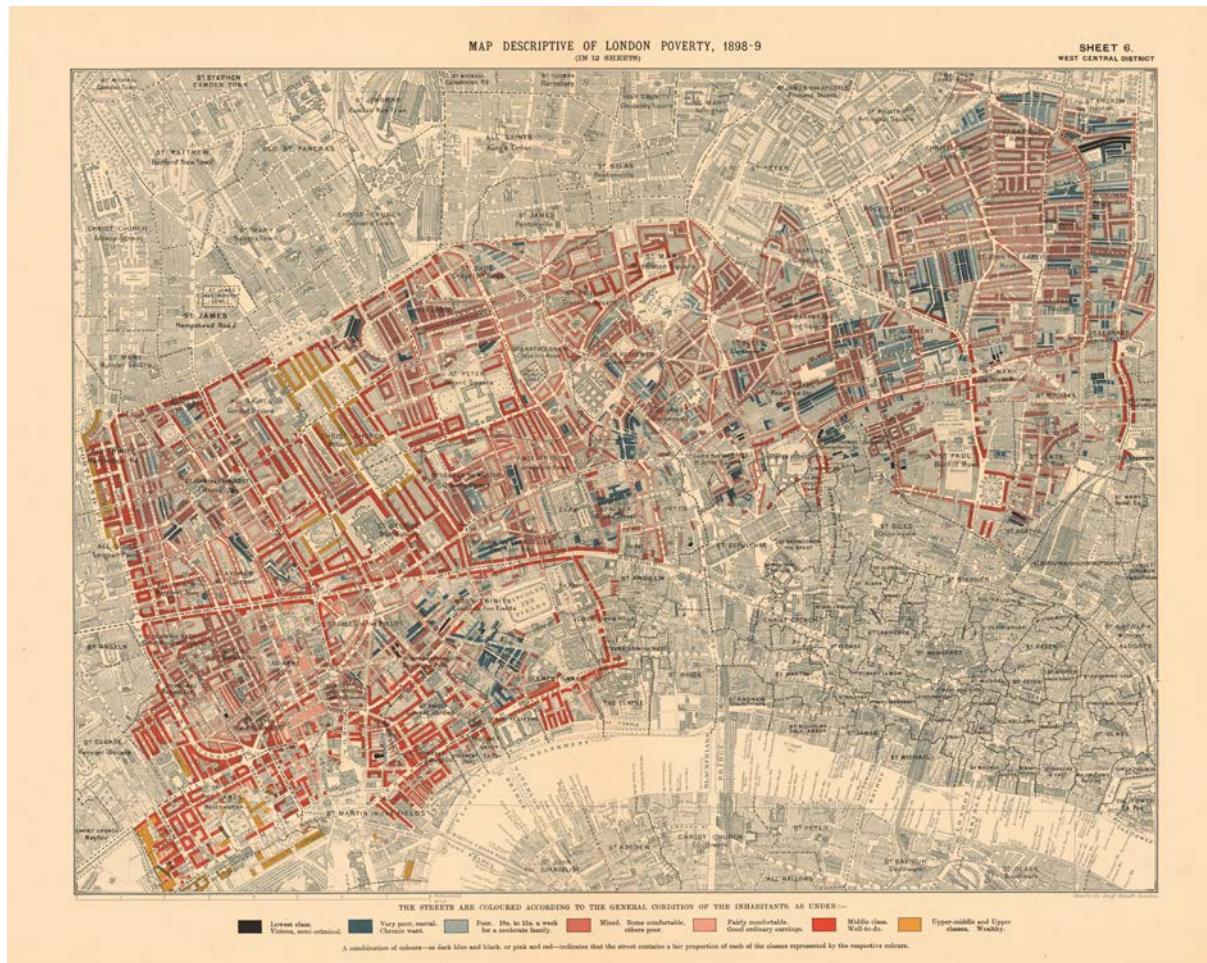


Fig.10
London Poverty Maps (Sheet 6)
West Central District, 1898-9,
Charles Booth

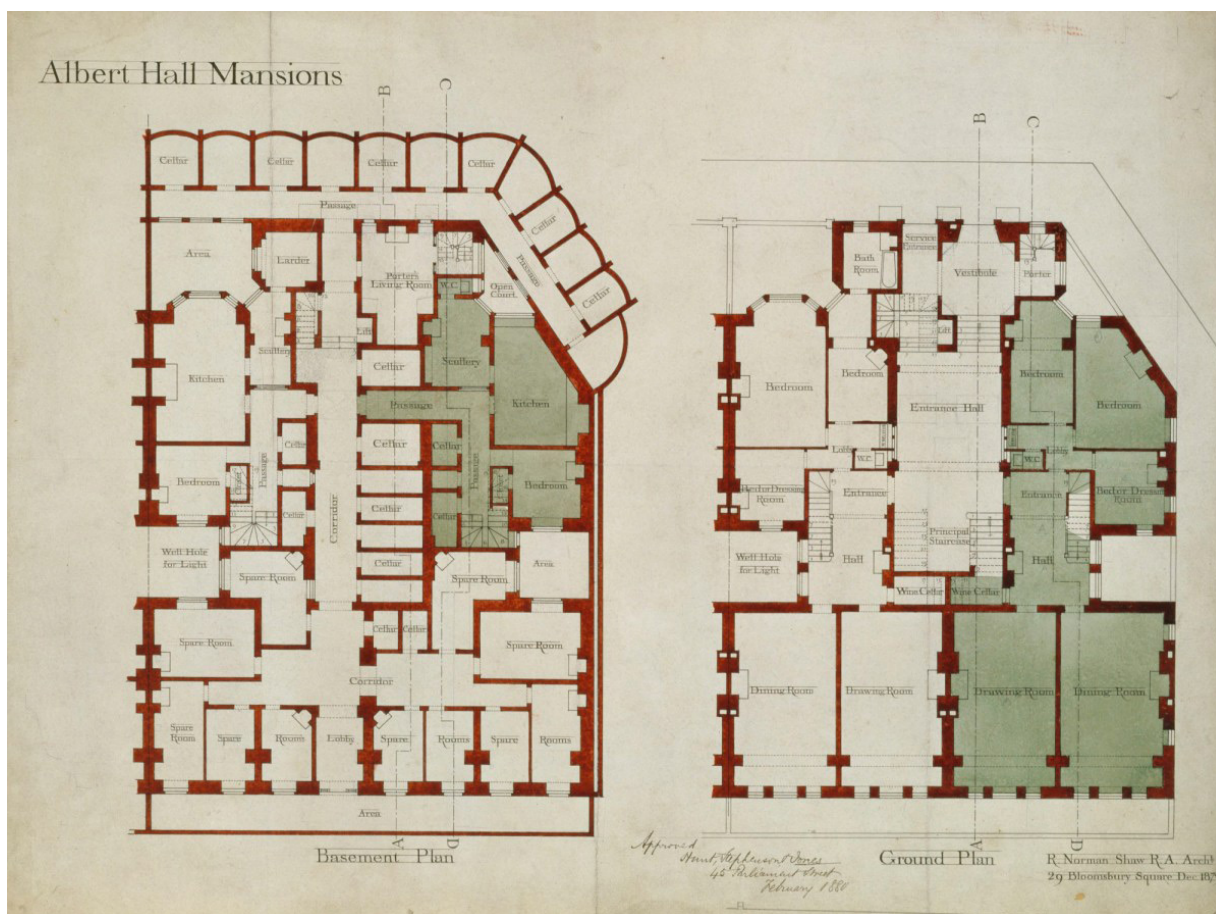


Fig.11
 Basement and Ground Floor Plan
 Albert Hall Mansions, Kensington, 1879,
 Richard Norman Shaw

Development in the suburbs offered economic housing solutions and different responses to demographic change, in large part due to cheaper land cost, however, many housing challenges remained to London's poorest inhabitants. Their housing conditions were documented in Charles Booth's poverty maps from the 1880s, with his subsequent publication *Life and Labour of the People of London* recording that 35% of the city's population were found in the lower three categories of Booth's classification of poverty – 'lowest', 'very poor', and 'poor' (Fig. 10).²⁸ His maps are a distinct example of biopolitical history and show how poverty was linked to morality, classifying the lowest class as among the criminals. The maps were subsequently used as evidence to decide on areas for slum clearance. Thus, public and moral health were important drivers of Victorian urban transformation.

The closing decades of the Victorian era also saw new urban developments for the upper-middle class. The mansion block became an important new typology, as it required little land for the construction of high-density flats that offered wealthy families convenient homes in desirable parts of London. Albert Hall Mansions, designed by Richard Norman Shaw and built in 1886, borrowed ideas from French apartments, with each floor plan offering a unique mix of unit typologies including triplexes (Fig. 11). Other mansion blocks were built in St John's Wood, Kensington, and Mayfair.²⁹ Although there was necessity and demand, investment in mansion blocks was at first risky because of an association of apartment living with tenements for the lower classes. It was also much easier for developers to raise capital for individual houses than a whole block of flats.³⁰

The rise of high-density housing led eventually to the introduction of height restrictions and greater regulation by the London Building Acts between 1890 and 1894.³¹ Under the previous Building Acts of 1855 and 1877, new buildings exceeding 30 m in height required permission from the Metropolitan Board of Work to ensure that walls were structurally sufficient. Concerned with fire risks and the safety of people living in highrise buildings, the London County Council supported new legislation to restrict the height of buildings to 30 m (100 ft) in 1894 (with an additional two storeys permitted in the roof space).³² The legislation was also rooted in a larger cultural resistance to highrise buildings and people complaining about them blocking their views. In addition, due to a lack of lifts, a flat on a floor above would be valued at approximately 10% less, contrary to how present-day flats are valued.³³

28.

Booth's classification of poverty: lowest class (vicious, semi-criminal), very poor (chronic want), poor (18 to 21 shillings a week for a moderate family), mixed, fairly comfortable, middle-class (well-to-do), and upper-middle and upper classes (wealthy).

29.

Porter, p. 236.

30.

Emily Greeves and Ellis Woodman, *Home/Away: Five British Architects Build Housing in Europe: The Development of Housing in Britain 1870-2008* (London: British Council, 2008), p. 34.

31.

Richard Dennis, "'Babylonian Flats' in Victorian and Edwardian London," *The London Journal*, 33:3 (2008), pp. 233-247.

32.

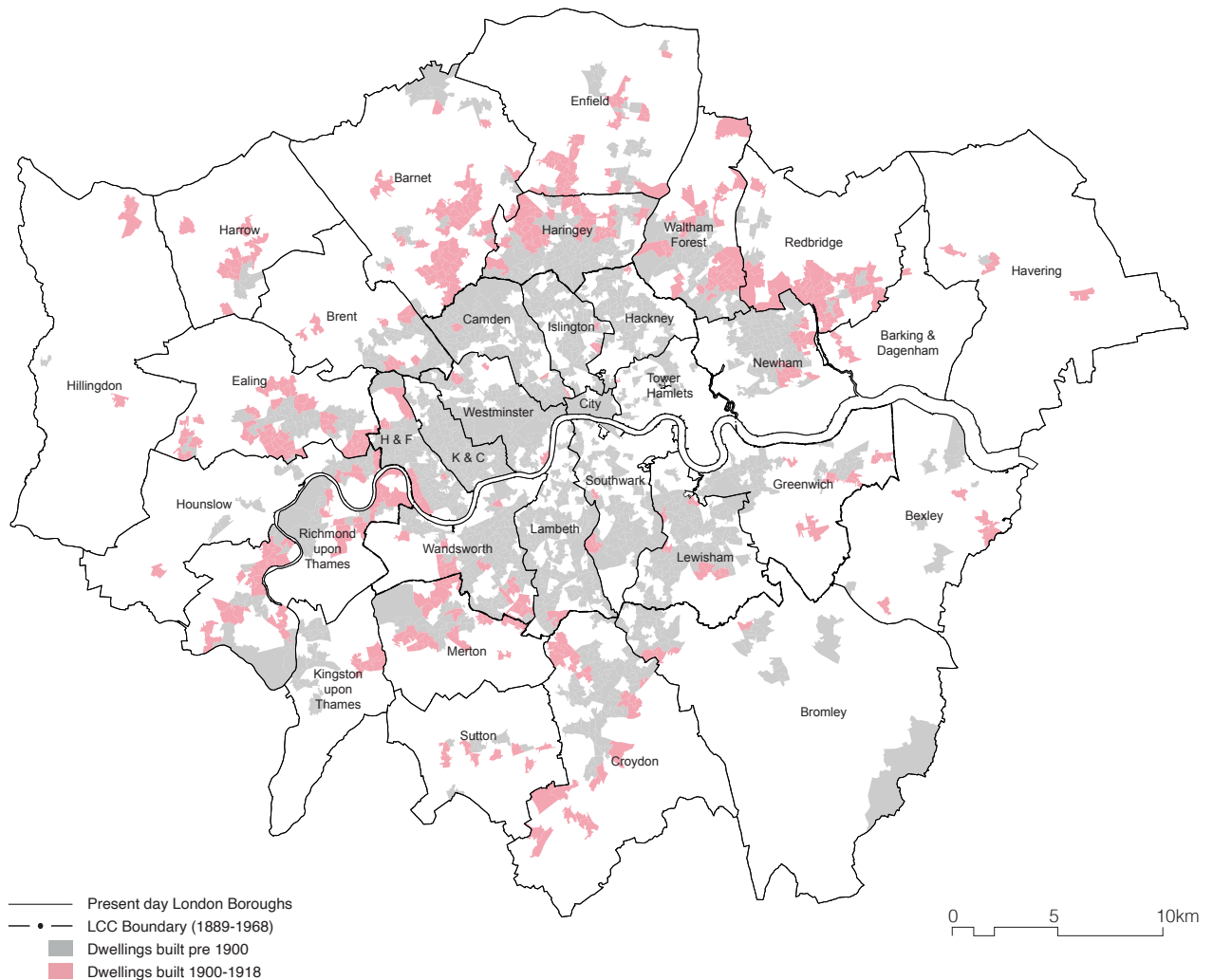
C C Knowles and P H Pitt, *The History of Building Regulations in London, 1189-1972* (London: Architectural Press, 1972), p. 93.

33.

Dennis, p. 243.

1900-1919

Early Twentieth-Century London: The LCC and City Suburbs



At the turn of the twentieth century, London reached a population of 4.5 million, compared to a modest 864,000 at the beginning of the 1800s.³⁴ By 1911, the population was 7 million, of which 2.7 million lived in the city's 'outer ring'.³⁵ Moreover, 40% of London families were in shared accommodation that did not meet new sanitation standards.³⁶ Formed in 1889, the London County Council (LCC) was to become the main metropolitan government body for the County of London with 28 new democratically elected municipal boards, replacing city former vestries and districts.³⁷ The LCC took on responsibility for the licensing and inspection of common lodging houses from the city police. Combined with the Building Act 1890, the formation of the LCC paved the way for a new age of

34. Miller, p. 1.

35. Porter, p. 205.

36. S Muthesius, p. 3.

37. Only in 1900 did London have an elected government responsible for its electorate. See, R Vladimir Steffel, 'The Slum Question: The London County Council and Decent Dwellings for the Working Classes, 1880-1914', *Albion*, 5.4 (1973), p. 316.

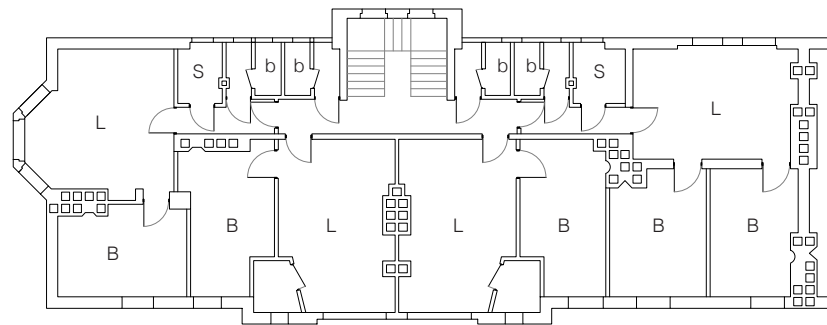
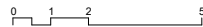


Fig.12
Fourth Floor Plan
Benson Building, Boundary Estate. 1900,
London County Council, Owen Fleming



38.
J A Yelling, *Slums and Slum Clearance in Victorian London* (London: Taylor & Francis, 2015), p. 265.

working-class housing in London.³⁸ The cost of land greatly determined the LCC housing strategy and, similar to philanthropic models, developed two main housing typologies: flats and cottages. Due to high construction costs and scarcity of development land, high-density housing and blocks of flats became common in inner London.

39.
Greater London Council and Kenneth Campbell, *Home Sweet Home: Housing Designed by the London County Council and Greater London Council Architects 1888-1975* (London: Academy Editions, 1976), p. 22.

The first LCC housing schemes were based on the layout of tenement blocks used by housing trusts, however, later projects provided more outdoor spaces and decorative facades, inspired by the Arts and Crafts movement.³⁹ An example of this is the Boundary Estate (1900) designed by the LCC architect Owen Fleming, which replaced the Old Nichol rookery. Its design deliberately differed from previous tenement blocks and slum cottages and placed five-storey buildings radially around a central public space. The Boundary Estate also included shops, a surgery, workshops, laundry facilities, and two schools. The flats were designed according to space standards deemed suitable for the lower-middle class and with the nuclear family in mind. Flats were generous in size to encourage indoor living and give privacy (Fig. 12). The following years saw several similar high-density estates built by the LCC in other London boroughs, with the Millbank Estate in Pimlico (1899), erected on the former Millbank prison site, exemplary for its innovative approach to housing standards and provision of individual toilets and sculleries.⁴⁰ By 1912, the LCC had completed 13 slum clearance projects and, by 1914, had built almost 10,000 new homes.⁴¹

40.
Miller, p. 2.

41.
GLC and Campbell, p. 32.

Rising labour and land costs led the LCC to focus on the outer areas of London for its developments.⁴² However, to integrate housing with necessary transport networks, the LCC required parliamentary approval to build

42.
Ibid.

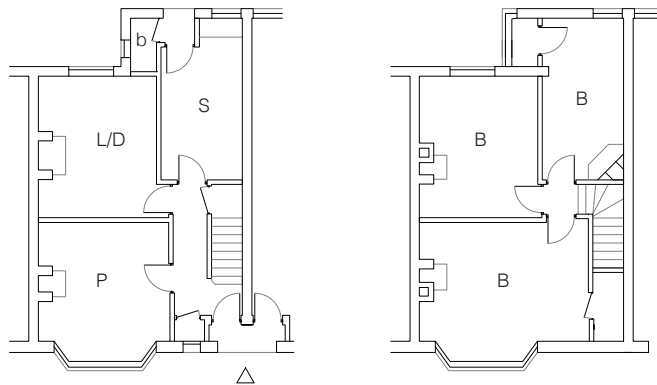
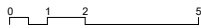


Fig. 13
Ground and First Floor Plan
5 Room-3 Bedroom Cottage, White Hart Lane Estate, Tottenham, 1913,
London County Council, W.E. Riley



outside its administrative boundary.⁴³ At the time the Millbank Estate was under construction, the LCC bought its first outer London sites to develop Totterdown Fields in Tooting (1903), White Hart Lane in Tottenham (1904), and Old Oak in Hammersmith (1912) (Fig. 13). The lower land cost made the design of low-density estates in comparison to inner-city sites possible. Strongly influenced by Ebenezer Howard's book *Garden Cities of Tomorrow* (1898), these estates had small two-storey cottages with gardens. These cottage estates soon became desirable and a housing model for subsequent speculative suburban developments.⁴⁴

Despite being inspired by Howard's garden city ideals, the developments formed peripheral garden suburbs contrary to his demand of creating new independent towns surrounding London and resulted in the very suburban sprawl that he sought to avoid. But other important factors contributed to the expansion and development of outer London: an agricultural depression leading to cheaper development land, standardisation and mass production creating more affordable dwellings and the expansion of London's transport system enabling long-distance daily commutes.

During World War I (1914–18), the growth of ammunition factories and war-related industries created a demand for new housing for factory workers. Well Hall Estate (now Progress Estate) is an example built in 1915 in Woolwich as a garden suburb to accommodate the workers of the Royal Arsenal. Its layout follows low-density schemes by Richard Parker and Raymond Unwin before the war, with terraced housing rows of 16 units each distributed along winding streets, resembling an early modern town rather than the contemporary terraced housing being built elsewhere.⁴⁵

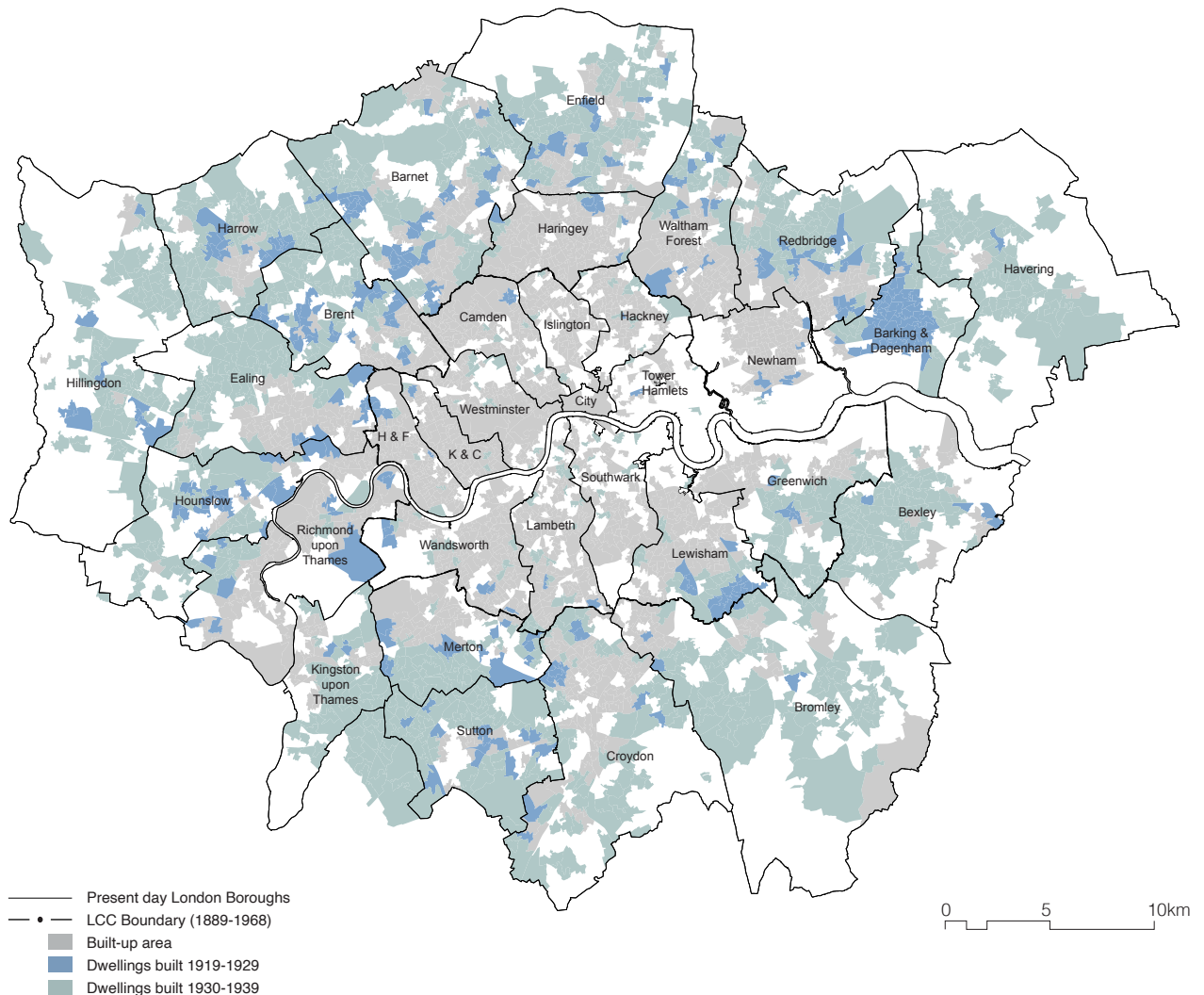
43. The Housing of the Working Classes Act of 1900 would address this. Andrew Saint, *Politics and the People of London: The London County Council 1889-1965* (London: Hambledon, 1989), p. 219.

44. Historic England, *Domestic 3: Suburban and Country Houses - Listing Selection Guide* (London: English Heritage, 2011), p. 15.

45. Mark Swenarton, *Building the New Jerusalem: Architecture, Housing, and Politics, 1900-1930* (Bracknell, England: IHS BRE Press, 2008), p. 18.

1919-1939

Interwar years: The Addison Act and Tudor Walters Report



Published in November 1918 at the end of World War I, the *Report of the Committee Appointed to Consider Questions of Building Construction in Connection with the Provision of Dwellings for the Working Classes* by the Tudor Walters Committee was planning for the housing shortage caused by thousands of soldiers returning home and, as the prime minister Lloyd George promised, would deliver 'homes fit for heroes'.⁴⁶ The report emphasised the importance of regulating the size of dwellings and the aspects and quality of neighbourhoods while acknowledging that regulations can limit innovation, especially in the adoption of new materials and methods of construction.⁴⁷ It argued for the simplification of housing design, the importance of good proportions, and that better design would have economic benefits.⁴⁸ Aspects of town and site planning, such as street width and layout,

46. In 1918, only women who were householders over the age of 30, the wives of householders, occupiers of property with an annual rent of £5, or graduates from a British university had the right to vote, a total of approximately 8.4 million women.

47. Tudor Walters Committee, *Tudor Walters Report* (London: United Kingdom Parliament, 1918), p. 9.

48. Mark Swenarton, *Homes Fit for Heroes: the Politics and Architecture of Early State Housing in Britain* (London: Routledge, 2018), p. 111.

House with Parlour	Floor Areas (m ²)	House without Parlour	Floor Areas (m ²)
Parlour	11.2		
Living Room	16.7	Living Room	16.7
Scullery	7.4	Scullery	7.4
Larder	2.2	Larder	2.2
Bedroom 1	14.9	Bedroom 1	13.9
Bedroom 2	11.2	Bedroom 2	9.3
Bedroom 3	10.2	Bedroom 3	6.0

Table 1
Provision of Space and Rooms according to Dwelling Type
Tudor Walters Committee, Tudor Walters Report, 1918

orientation, and density were discussed in detail. A series of model plans for two-storey cottages were proposed and recommended they be arranged ‘in groups of four or six, with medium or low-pitched roofs and little exterior decoration.’⁴⁹ The report suggested a minimum provision of a living room, scullery, three bedrooms on the second floor, a larder, and a bathroom (Fig. 14). Although having a parlour was desired, they were not recommended unless extra rent could be charged to cover the higher cost of construction.

The historian Mark Swenarton considers the *Tudor Walters Report* not a mere housing manual, but as defining ‘the theory and practice of low-cost housing design.’⁵⁰ Similarly, the practitioner Julia Park states that it was ‘an extremely important step in the evolution of housing standards – perhaps the first time that housing quality was formally acknowledged to be a matter of national importance.’⁵¹ Prior to the *Tudor Walters Report*, housing regulations had focused on public health issues whereas this, for the first time, focused on housing design. A major reason for this was the recognition that traditional construction methods could not meet the required scale and speed of the expected post-war housing programme. To support the technical work by the Tudor Walters Committee, the Building Materials Research Committee (BMRC) was formed in 1917 by the Department of Scientific and Industrial Research, the first research organisation specifically dedicated to building science. Chaired by Raymond Unwin, it explored the use of concrete in floors and roofs as an alternative to timber that was in short supply.⁵² Other members of the BMRC were G W Humphreys, chief engineer of the LCC, E S Prior as a representative of the RIBA, and the social reformer Seebohm Rowntree. However, disagreements over the post-war housing programme and lack of funding limited the scope of the BMRC and its impact. The BMRC eventually became the Building Research Station (1921), a precursor to the Building Research Establishment.

49.
Ibid, p.1.

50.
Swenarton, *New Jerusalem*, p. 25.

51.
Julia, Park, *One Hundred Years of Housing Space Standards: What Now?* (Levitt Bernstein, 2017), p. 18.

52.
Mark Swenarton, ‘Breeze Blocks and Bolshevism: Housing Policy and the Origins of the Building Research Station 1917-21’ *Construction History* 21 (2005), p. 69-80.

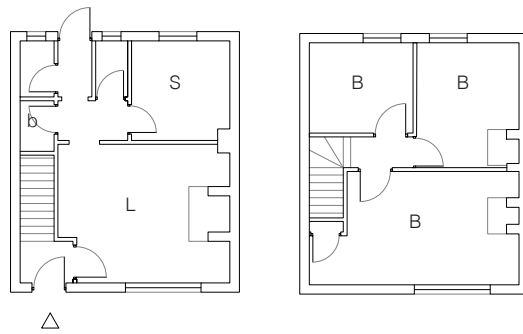


Fig.14
Ground and First Floor Plan
3 Bedroom House Type
Tudor Walters Committee, Tudor Walters Report, 1918

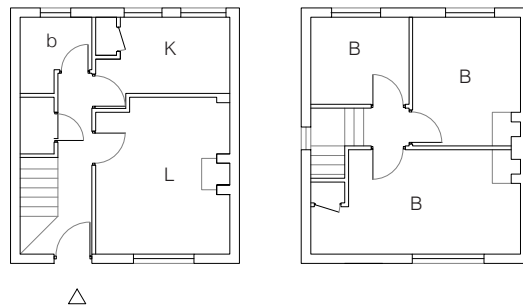


Fig.15
Ground and First Floor Plan
3 Bedroom House Type
Manual on the preparation of State-aided Housing Schemes
(Housing Manual), Local Government Board, 1919

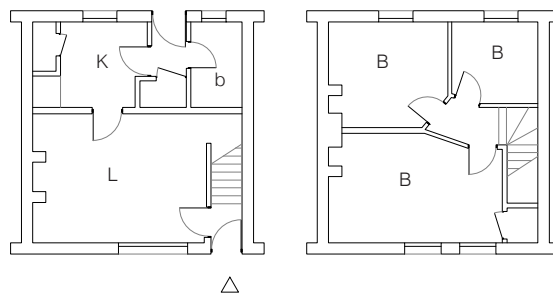
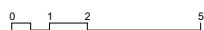


Fig.16
Ground and First Floor Plan
3 Bedroom House, Chapel House Estate, Poplar, 1921,
Office of Works, Sir Frank Baines



53.

The committee chair was the Minister of Health, Christopher Addison, who previously had worked under the Ministry of Munitions to provide temporary housing during the war. Compare, Swenarton, New Jerusalem, p. 13.

54.

'Public Housing in Poplar: The Inter-war Years', in *Survey of London: Volumes 43 and 44, Poplar, Blackwall and Isle of Dogs*, ed. Hermione Hobhouse (London: London County Council, 1994), p. 23.

55.

Tom Burden, Charlie Cooper, and Stephanie Petrie. *Modernising Social Policy: Unravelling New Labour's Welfare Reforms*. (London: Routledge, 2019), p. 168.

56.

Marian Bowley, *Housing and The State 1919-1944* (New York & London: Garland Publishing, 1985), p. 271.

57.

Housing, Town Planning, &c. Act 1919.

58.

Bowley, p. 15.

59.

Hobhouse, p. 27.

60. Compared with 900 sq ft suggested in the Manual, one three-bedroom home at Chapel House Street had an internal floor area of 675 sq ft. See Hobhouse, p. 27.

61.

John Stevenson, *British Society 1914-45* (London: Penguin Books, 1984), p. 222.

62.

Alison Ravetz, *Council Housing and Culture* (Florence: Taylore & Francis, 2003), p. 90.

63.

Hobhouse, p. 31.

64.

Ravetz, p. 87.

The year following the report's publication, the Housing, Town Planning, &c. Act of 1919 (known as the Addison Act or the Housing Act), originally conceived as a temporary measure to deal with a widespread housing shortage and high building costs, was ratified to address the key issues identified by the *Tudor Walters Report*.⁵³ The act made it mandatory for local authorities to assess housing demands in their area and develop plans for the provision of housing under the approval of the Ministry of Health.⁵⁴ Local authorities would follow the layouts and designs published in the *Manual on the Preparation of State-aided Housing Schemes* (1919) (Fig. 15). Although local authorities had little experience as housing developers or landlords, they had experience in implementing public health measures and, with the design guides, were seen by the state as easier to control to achieve the housing goals than private or philanthropic organisations.⁵⁵

Before the Addison Act, local authorities only supplied 2% of all new dwellings, but in the four years between 1919 and 1923, this rose to more than 60%.⁵⁶ The act also made provisions for subsidies to local authorities to deliver the ambitious goal of building 500,000 new council homes within three years, and a Treasury grant to absorb losses in the Housing Revenue Account.⁵⁷ Subsidies were funded through rental returns, local authority rates, and state grants. The 1919–1921 housing programme differed from preceding state-subsidised ones that responded to post-war housing needs by creating a process of direct state intervention and forcing Borough Councils to build public housing.⁵⁸

The Chapel House Street Estate, completed in 1921 by the Office of Works for Poplar Council, is a noteworthy example of the new public housing schemes (Fig. 16).⁵⁹ The estate design followed Howard's garden city principles and provided modern electric lighting, however, like many interwar council developments, it exceeded the density recommended by the Addison Act 1919.⁶⁰ The act had recommended no more than 12 houses per acre in urban areas, whereas Chapel House Street Estate had a density of 15 dwellings per acre.

Despite its success, there were many shortcomings to the new housing programmes. Of the 500,000 homes planned, only 213,800 were built in the planned three years.⁶¹ Also, as the economist Marion Bowley claims, the high design standards demanded by the *Tudor Walters Report* and the Addison Act, were major contributors to rising rental costs, making new homes unaffordable to the working-class families they were intended for.⁶² Therefore, by 1921 the Ministry of Health informed local authorities that the previous minimum requirements set by the Addison Act were now to be considered maximum housing standards to reduce rent and construction costs.⁶³ In addition, the Housing (Financial Provisions) Act 1924 (Wheatley Act) took measures to increase housing subsidies, and while by 1935 over 500,000 dwellings were built with its help, this was predominantly in urban districts, ignoring the rural-urban balance supported by the Addison Act.⁶⁴

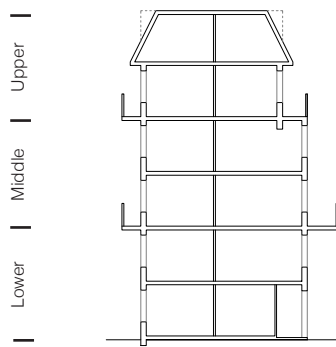


Fig.17
Section (1:400)
Riverside Mansions, Poplar, 1928

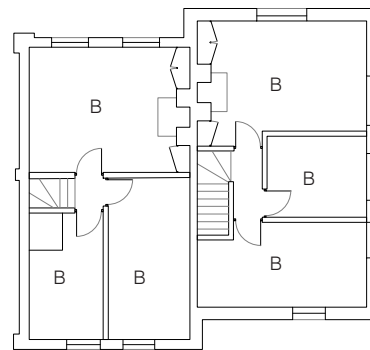
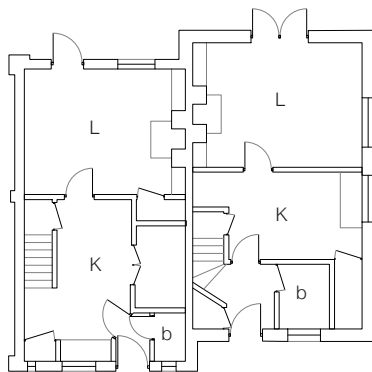
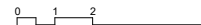


Fig.18
Ground Floor and First Floor Plan
Lower Flat, Riverside Mansions, Poplar, 1928



From the wake of World War I, the LCC's focus was on suburban development, building numerous self-contained two-storey family cottages with three bedrooms in outer London. The largest of its kind, Becontree Estate in East London, is a garden city for 90,000 people, with its construction taking two decades starting in 1921.⁶⁵ The layout of the estate was informed by the space standards of the *Tudor Walters Report* (1918) by following, amongst others, the recommended street widths of a minimum 21 m to prevent overshadowing.⁶⁶ Other examples of so-called 'garden estates' include Watling Estate in Edgware (1930), Castlenau in Richmond (1928), Downham Estate in Bromley (1930), and Dover House Estate in Roehampton (1927). The absence of traditional working-class leisure facilities in the vicinity of many suburban estates, such as pubs or social clubs, encouraged people to turn to activities within their home and garden.⁶⁷

65. Greeves and Woodman, p. 52.

66. *Tudor Walters Report*, p. 15. The report mentions that according to medical opinion, rooms must allow plenty of sunshine, suggesting a distance of 70 ft between two storey houses, reduced to 50-60 ft if justified.

67. In the LCC's Norbury cottage estate (1906-1910) shops were provided but a pub was not allowed. Peter Scott, *The Making of the Modern British Home: The Suburban Semi and Family Life Between the Wars* (Oxford: Oxford University Press, 2013), p. 93.

68.
Hobhouse, p. 34.

69.
'Post-War Housing, 1945-1960s - Introduction', Domestic Architecture 1700 - 1960, University of the West of England <https://fet.uwe.ac.uk/conweb/house_ages/flypast/section11.htm> [accessed 15 January 2020].

70.
Ravetz, p. 93.

71.
Simon Pepper and Peter Richmond, 'Stepney and the Politics of High-Rise Housing: Limehouse Fields to John Scurr House 1925-1937', *The London Journal*, 34:1 (2009), p. 43.

72.
'The Riverside Mansion', *The Builder*, (31 August 1928), p. 338-42. This development was influenced by the unrealised Limehouse Fields by Barnes and Davidge.

73.
Pepper, p. 50.

74.
Florian Urban, *Tower and Slab: Histories of Global Mass Housing* (London: Routledge, 2011), p. 12.

75.
NHBC Foundation, *Homes Through the Decade: The making of modern housing* (Milton Keynes: NHBC Foundation, 2015), p. 10.

76.
Hilde Heynen and Gülsüm Baydar, eds., *Negotiating Domesticity: Spatial Productions of Gender in Modern Architecture* (London: Routledge, 2005), p. 57.

77.
Ibid., 59.

78.
Ibid., 58.

However, these new suburban developments did little to alleviate the pressures of overcrowding in central London, with urban housing developments seeing a reduction in the floor area of newly built cottages and homes. The Housing Act 1930 (Greenwood Act), while promoting slum clearance, specifically subsidised the construction of flats by local authorities instead of cottages.⁶⁸ By 1936, the number of flats delivered exceeded that of cottages for the first time.⁶⁹ But space standards in England were also at their lowest around 1936.⁷⁰

Nevertheless, the idea of living in multi-storey housing had begun to gain acceptance. In London, the design of developments changed from tenement buildings to multi-storey housing with open spaces, lifts, and on-site facilities. The new LCC flats, however, had problems with privacy caused by open access galleries and, in an attempt to address this and incorporate some garden city characteristics in urban flats, maisonettes or 'self-contained cottages' were introduced that in their internal layout and access arrangement were closer to houses.⁷¹ An example of this is the low-rise garden city design for Riverside Mansions (1928) by Culpin & Bowers.⁷² Six-storey buildings offered maisonette flats, with the development boasting automatic passenger lifts, drying rooms, a maternity and child welfare centre, a children's library, and a gymnasium (Figs. 17-18). As noted by Simon Pepper, due to an array of on-site amenities, the development of these council flats 'set unusually high standards' in the housing sector.⁷³

With the Modern Movement spreading across Europe, the first mass housing developments in the UK were completed in the 1930s.⁷⁴ Inspired by the principles of the Modern Movement, experimentation in open-plan living revolutionised how people lived in their urban homes.⁷⁵ Among the earliest examples of this is the acclaimed eight-storey tall Highpoint apartments in Highgate (1933-1938) by Berthold Lubetkin. The first prominent example of the public housing is Kensal House (1938) in Ladbroke Grove, a development of 68 worker apartments designed by Maxwell Fry and Elizabeth Denby for the Gas, Light, and Coke Utility Company. Responding to the debate on *Existenzminimum* in mainland Europe, this project saw the size of rooms correspond to their intended function.⁷⁶ By minimising service areas, living areas in the two- and three-bedroom apartments were maximised and included two balconies, one for leisure and the other for the drying of clothes (Fig. 19). According to Elizabeth Darling, Kensal House presented itself as a reformed private dwelling 'that would enable each individual to assume its appropriate role within the family'.⁷⁷ For women, this meant a functional and fully equipped kitchen, permitting them to carry out household chores easily. These principles were significantly informed by notions of optimisation and efficiency as presented by Margarete Schütte-Lihotzky's Frankfurt Kitchen.⁷⁸ A social reformer, Denby also proposed various communal rooms, a nursery, and garden to foster a greater sense of community.



Fig.19
First Floor Plan
2-3 Bedroom Flats, Kensal House, North Kensington, 1936,
Gas, Light and Coke Company, Maxwell Fry with Elizabeth Denby

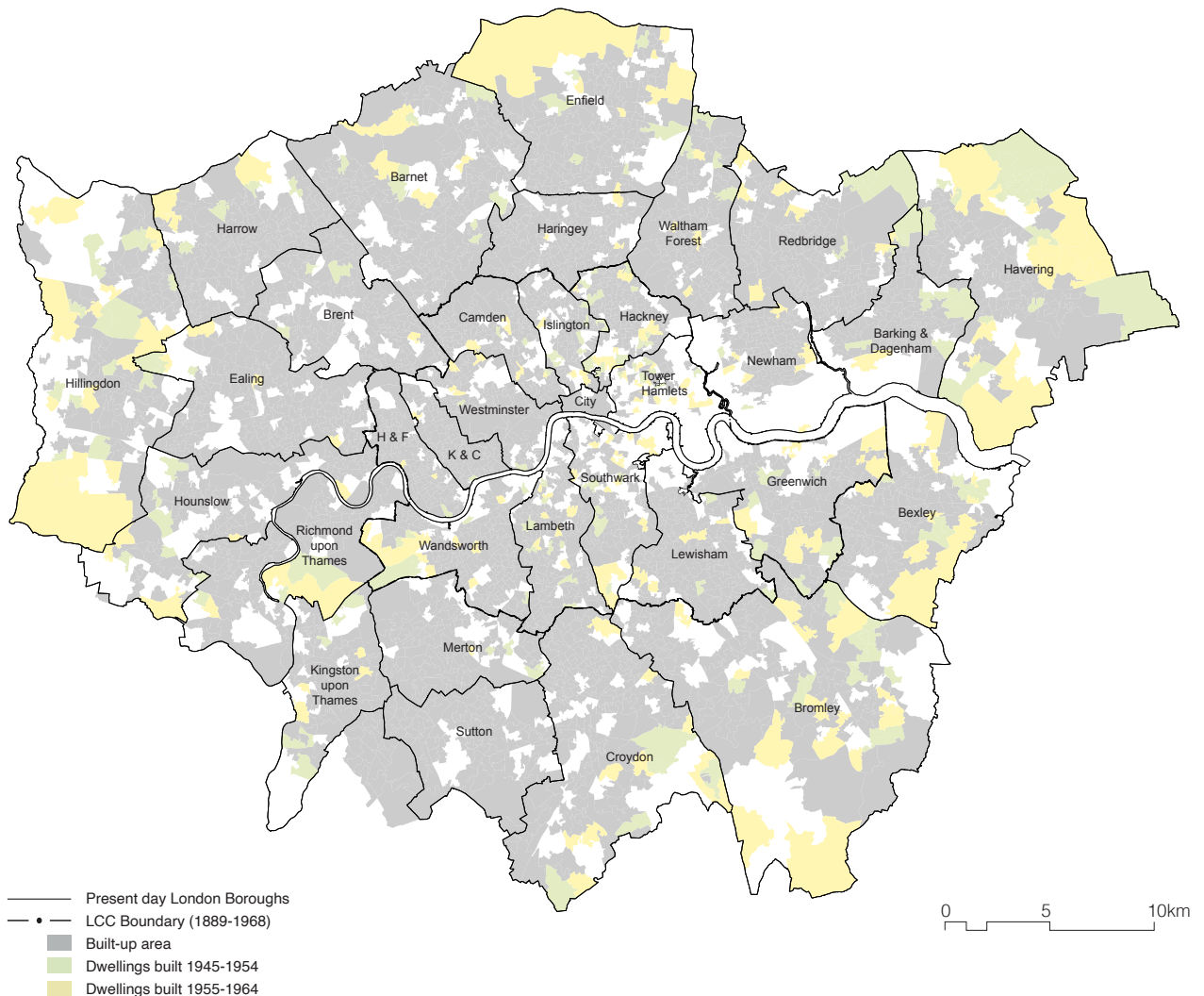
After the *Tudor Walters Report*, the Housing Act 1935 – defined by Julia Park as the ‘next important milestone’ in housing legislation – addressed the increasingly common problem of overcrowding in the private rental sector before World War II. It defined overcrowding as two or more unmarried people of the opposite sex and above the age of ten sleeping in the same room. It also calculated and regulated the maximum number of residents that should be occupying a dwelling. These calculations, however, did not include children under the age of ten, and the definition of ‘room’ included the kitchen as a habitable room.⁷⁹ When compared to statistics from 1911, the interwar period (1920–1938) saw a 52% increase in the overall housing stock.⁸⁰ Despite this substantial growth and increased effort to provide more housing in London, the city continued to suffer from overcrowding on the advent of World War II in 1939.

79.
Park, *One Hundred Years*, 20.

80.
Ibid, 19.

1940-1960

Postwar London: The Dudley Report (1944) and Housing Manual(s) 1944/49



Throughout World War II, one million homes – equivalent to roughly 90% of the total British public housing stock – were lost to bomb damage (Fig. 20).⁸¹ Of the LLC's 98,000 homes, 89,000 were damaged and 2,500 completely destroyed.⁸² The housing shortage in London was further exacerbated by a growth in population. In response, the Housing (Temporary Accommodation) Act 1944 committed to providing homes for every family in need and to completing the pre-war slum clearance project. To achieve this, it offered subsidies to privately-built homes, increased jobs and training within the building industry, and planned for the construction of a minimum of 300,000 within the following two years (Emergency Factory Made programme).⁸³ In particular, it supported the construction of temporary prefabricated homes and prevented building price inflation by controlling

81. 100,000 of these were in London London County Council and Walter Segal, *Housing: A Survey of the Post War Housing Work of the London County Council, 1945-1949* (London: London County Council, 1949), p. 77.

82. GLC and Campbell, p. 44.

83. Rex Pope, *War and Society in Britain 1899-1948* (London: Routledge, 2014), p. 78.

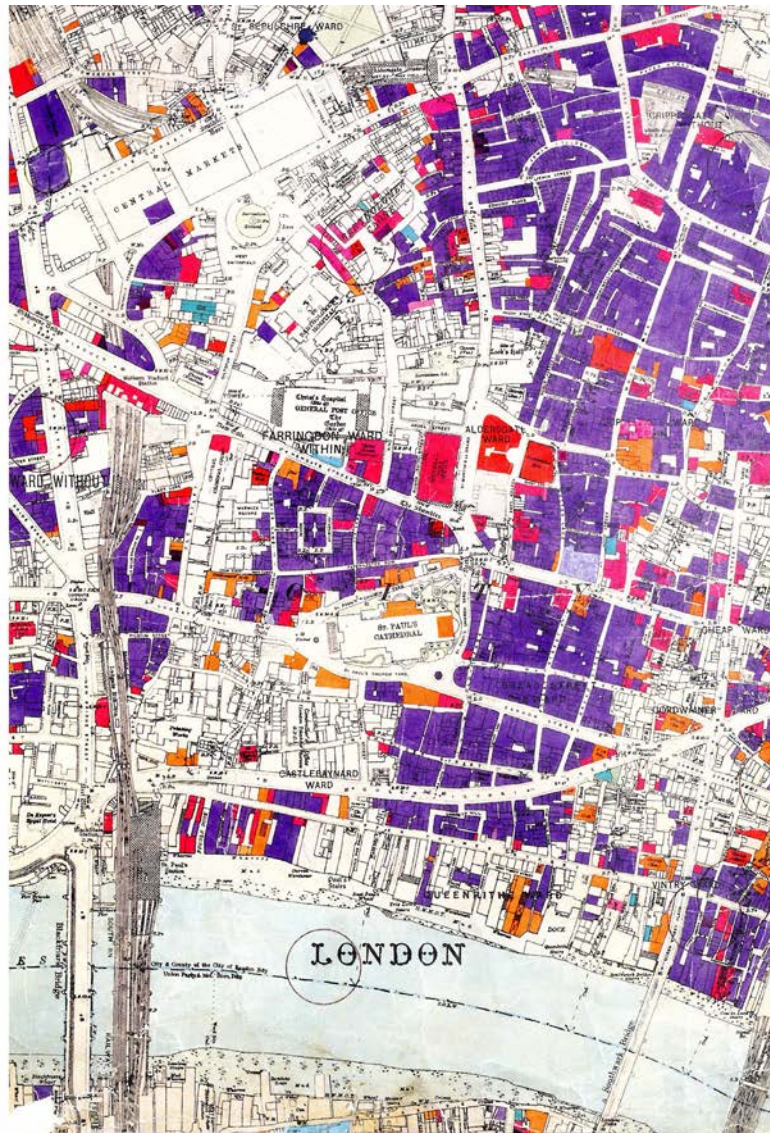


Fig.20
 LCC Bomb Damage Map 1939-45
 Holborn, Bloomsbury, City of London (West)
 Purple = Damaged Red = Demolished



Fig.21
London: Social and Functional Analysis,
Abercrombie Plan, 1943

rent and purchase prices.⁸⁴ To manage the growing need for new housing, the Department of Housing Valuation was later formed, with responsibility for housing design, construction, and land acquisition and, in 1946, housing subsidies to local authorities were tripled.⁸⁵

While already starting before the war, it was in the late 1930s that policymakers became increasingly interested in public opinion but also in how to influence or change it. Surveys, opinion polls, exhibitions, and publications were widely used in the 1940s during the post-war reconstruction project to engage with the public. In addition, housing associations, charity groups, and social science researchers played an important role in defining post-war housing policies such as the *County of London Plan* (1943), the Dudley Committee's report *Design of Dwellings* (1944), the *Housing Manuals* (1944 and 1949), and even the later *Parker Morris Report* (1961). For example, the Housing Centre Trust, founded in 1934 and chaired by Patrick Abercrombie, promoted 'the improvement of housing conditions by the dissemination of information and the building of an informed public opinion'.⁸⁶ The charity, led by architects and social

84. Housing (Temporary Accommodation) Act 1944.

85. Brian Lund, *Housing Politics in the United Kingdom: Power, Planning and Protest*, (Bristol: Policy Press, 2016), p. 158.

86. Caitriona Beaumont, 'Where to Park the Pram? Voluntary Women's Organisations, Citizenship and the Campaign for Better Housing in England, 1928–1945', *Women's History Review*, 22.1 (2013), pp 75–96.

87. Claire Langhamer, 'The Meanings of Home in Postwar Britain', *Journal of Contemporary History*, 40.2 (2005), pp. 341–362.

88. Ibid, p. 343.

89. A shortened popular Penguin edition was published in 1945 by the RIBA Librarian Edward Carter and architect Erno Goldfinger.

90. While Abercrombie was not directly involved with the London Regional Reconstruction Committee, it is said their research influenced the report and became an important source of information. See, Peter Larkham and David Adams, *The Post-war Reconstruction Planning of London: A Wider Perspective*, Working Paper Series 8, (Centre for Environment and Society Research, Birmingham City University, 2011), p. 15.

91. London County Council, John H. Forshaw and Patrick Abercrombie, *County of London Plan* (London: Macmillan and Company for London County Council, 1944).

92. Marco Amati and Robert Freestone, *All of London's A Stage: The 1943 County of London Plan Exhibition* (Cambridge University Press, 2015).

93. The Mothers' Union collected 5,000 completed questionnaires from London, Birmingham, Chelmsford, Exeter, Llandaff, Mammoth, and Ely. Beaumont, p. 89.

94. Ibid, p. 92.

reformers, used pamphlets and its journal the *Housing Review* to share information on housing issues and had gained by the 1950s the reputation of being a significant housing lobby group. Another influential organisation was Mass Observation, whose social research project (1937–1950s) studied the 'anthropology of everyday lives' through surveys and personal diaries in Britain.⁸⁷ Employed by the Ministry of Information in 1940, the Mass Observation's post-war surveys asked what people desired for post-war life and housing, raising questions such as 'what does "home" mean to you?'.⁸⁸

In anticipation of the end of World War II, the *County of London Plan* of 1943 (Abercrombie Plan), was written by J H Forshaw, Chief Architect to the LCC, and architect and town planner Patrick Abercrombie.⁸⁹ The *County of London Plan* promoted the use of 'a mass of statistical and research data available from official sources [...] this fact is important to bear in mind when inevitable comparisons are made with previously-produced plans'.⁹⁰ The plan dealt with traffic congestion, a lack of quality housing, maldistribution of services and open spaces, and a lack of zoning. The report illustrated a series of proposals that suggested the neighbourhood unit as a solution to accommodate up to 10,000 residents, with each unit including a variety of densities, housing typologies, and community facilities (Fig. 21).⁹¹ The plan was first exhibited in County Hall for government officials and, due to its popularity, was moved to the Royal Academy in Piccadilly, marking a shift in public engagement in post-war town planning. The large-scale plans presented in the exhibition were diagrammatic and less for communicating specific details than to symbolically convey the new scientific approach to town planning. In 1945, the film *Proud City* by the LCC further highlighted this by disseminating information on the plan and promoting their modern planning methods based on state-of-the-art surveying equipment.⁹²

In 1942, as part of the government's reconstruction planning, the Ministry of Health set up a new housing sub-committee to find evidence on which to base housing improvements by working especially with women's organisations but also other voluntary organisations to seek their opinion and experience. The committee, known as the Design of Dwellings Committee, under the chair of Lord Dudley and with its seven female members (out of 18), reviewed the housing standards since the *Tudor Walters Report* to find solutions, once again, to a large-scale post-war housing shortage as well as an insufficient workforce and construction materials. Set up in 1936, the Women's Advisory Housing Council, which included more than thirty women's groups such as the Mothers Union and the National Council of Women, had the main objective of advocating for the housing needs of mothers and working housewives. Together with the Women's Group on Public Welfare, they coordinated a mass housing survey on how its members would like to live and how they wanted their homes to be laid out to meet their daily needs.⁹³ The Mothers Union found that women wanted spacious and affordable family homes with three to four bedrooms. The *Dudley Report*, and subsequent post-war *Housing Manuals*, integrated many requests made by the women's groups, a testament to their influence on housing design policy.⁹⁴

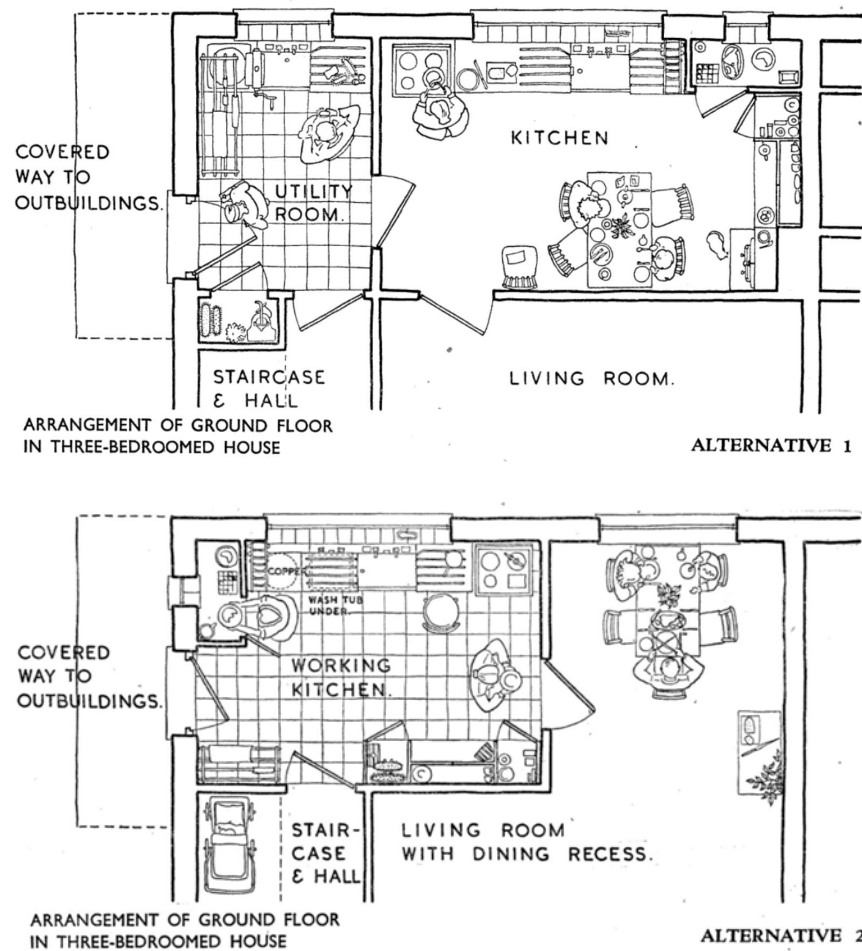


Fig.22
Arrangement of 3 Bedroom House,
The Dudley Committee, Dudley Report, 1944

Similar to the Abercrombie Plan, the *Dudley Report* emphasised the importance of the neighbourhood scale, the layout of housing estates, and the design of homes. The report also sought to advance building solutions and construction methods and proposed layouts for two-storey homes that instead of the traditional kitchen-dining room separated these into a kitchen and a dining room (Fig. 22).⁹⁵ But, although the LCC agreed on new standard post-war dwelling typologies in 1945, the pre-war standards plans would continue to be used to avoid delaying the building programme.⁹⁶

The idea of the 'neighbourhood unit' was promoted to foster interactions between different social classes and develop more self-contained communities.⁹⁷ These neighbourhoods took the form of mixed-use development schemes that tried to avoid both the isolated nature of cottage estates and the urban character of tenement blocks.⁹⁸ An example of this is

95. Central Housing Advisory Committee and Sub-Committee on the Design of Dwellings, *Design of Dwellings* (London: Ministry of Health, 1944).

96. Hobhouse, p. 37.

97. 'Post-War Housing, 1945-1960s - Introduction', *Domestic Architecture 1700 - 1960*, University of the West of England.

98. Nicholas Bullock, *Building the Post-War World: Modern Architecture and Reconstruction in Britain* (London: Routledge, 2002), p. 164.

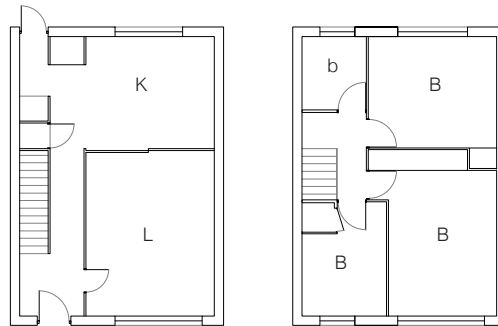


Fig.23
Ground and First Floor Plan
3 Bedroom Terraced House, Somerford Grove, Hackney, 1947,
Frederick Gibberd

Lansbury Estate in Poplar, which was based on the Abercrombie Plan and included a shopping mall, three schools, two churches, outdoor green spaces, and a health centre. Another example of a ‘mixed development’ is Somerford Grove (1946), a housing scheme in Hackney by Frederick Gibberd (Fig. 23). The project combined housing typologies designed for the needs of the elderly mixed with units for young families and implemented the density and urban design principles of the *Dudley Report*. The design also combined elements of modern architecture with traditional English architecture by using bricks, pitched roofs, and decorative balconies.

Just as the *Tudor Walters Report* had informed the Addison Act of 1919, so did the *Dudley Report* inform the *Housing Manual* of 1944.⁹⁹ The Housing Manual of 1944 provided recommended housing layouts with minimum room sizes and adequate circulation spaces, especially for two- and three-bedroom homes for younger families. It promoted higher densities of 120 homes per acre in central locations. It also stressed the need to calculate the number of people living in a home (assuming a two-bedroom house for four people as a common standard for calculation).¹⁰⁰ The report also endorsed more efficiency in buildings, giving details on new construction methods and materials.¹⁰¹ But, according to Jamileh Manoochehri, the 1940s council houses were more expensive than those built in the 1930s, due to inflation but also because of improved housing standards leading to a 25% cost increase corresponding to the increase of average dwelling size from 74.3 m² in 1939 to 92.9 m² in the 1940s (Figs. 24 and 29).¹⁰²

99.
Ibid.

100.
Jamileh Manoochehri, *The Politics of Social Housing in Britain*, (New York: Peter Lang AG, 2012), p. 24.

101.
Park, p. 21.

102.
Manoochehri, p. 26.

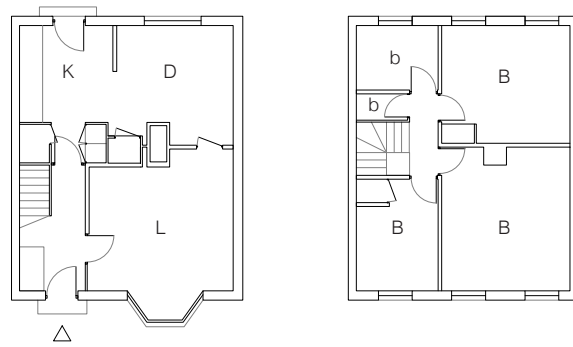


Fig.24
Ground and First Floor Plan
3 Bedroom House Type,
Ministry of Health and Works, Housing Manual, 1944

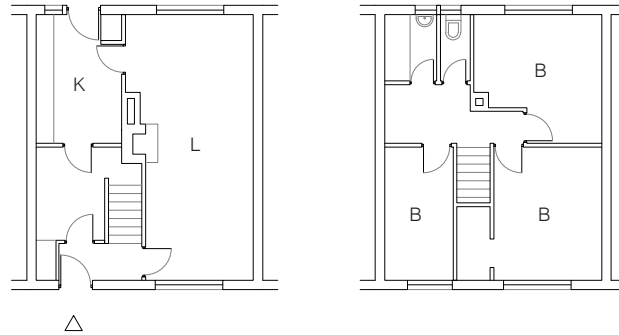


Fig.25
Ground and First Floor Plan
3 Bedroom House Type,
Ministry of Health and Works, Houses: Second Supplement, 1952

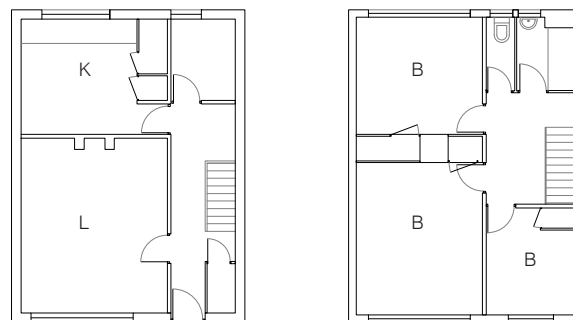
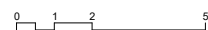


Fig.26
Ground and First Floor Plan
3 Bedroom House Type,
London County Council, Housing Type Plans, 1956



House Type	Dwelling Type	Room	Floor Areas (m ²)
A- Family Dwelling	Kitchen-Living room	Kitchen-Living Room	16.7 - 18.6
	(with a sitting room)	Same (where sitting room provided)	15.8 - 16.7
		Sitting room (if provided)	10.2 - 11.2
		Scullery-wash House	6.0 - 7.4
		Wash House only	3.3 - 4.2
		Scullery only	3.3 - 4.2
B- Family Dwelling	Working Kitchen	Living room (with no separate dining room)	16.7 - 18.6
		Living room & Dining room	18.8 - 22.8
		Working Kitchen	8.4 - 9.3
C- Family Dwelling	Dining - Kitchen	Living Room	14.9 - 16.7
		Dining Room	10.2 - 11.6
		Wash House	3.3 - 4.2
D- Family Dwelling	All Types	First Bedroom	12.5 - 14.0
		Other Double Bedroom	10.2 - 11.2

Table 2
Provision of Space and Rooms according to House Type
Ministry of Health and Works, Housing Manual, 1944

No. of Bedrooms	No. of Persons	Internal Floor Area (m ²)
Two Storey House or Maisonette		
2	4	69.7 - 74.3
3	5	83.6 - 88.3
3	6	91.1 - 95.7
4	6	92.9 - 101.3
4	7	102.2 - 109.2

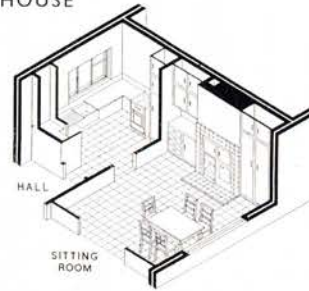
Table 3
Provision of Space in a Two Storey House or Maisonette
Ministry of Health and Works, Housing Manual, 1949

WAYS OF LIVING IN THE HOUSE

KL

KITCHEN - LIVING
ROOM

180 - 200 SQ. FT.



WK

WORKING KITCHEN

90 - 110 SQ. FT.



DK

DINING KITCHEN

110 - 130 SQ. FT.



FIG. 16

40

Fig.27
Ways of Living in the House,
Ministry of Health and Works, Housing Manual, 1949

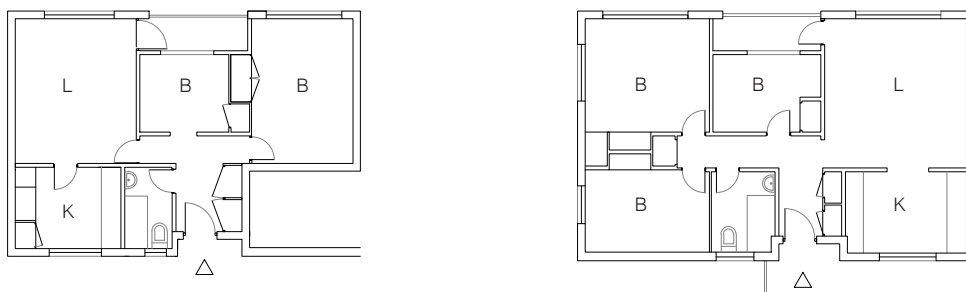


Fig.29
Proposed Flat Plans
2-3 Bedroom Flat Types (Designed for High Blocks with Lifts),
Ministry of Health and Works, Housing Manual, 1944

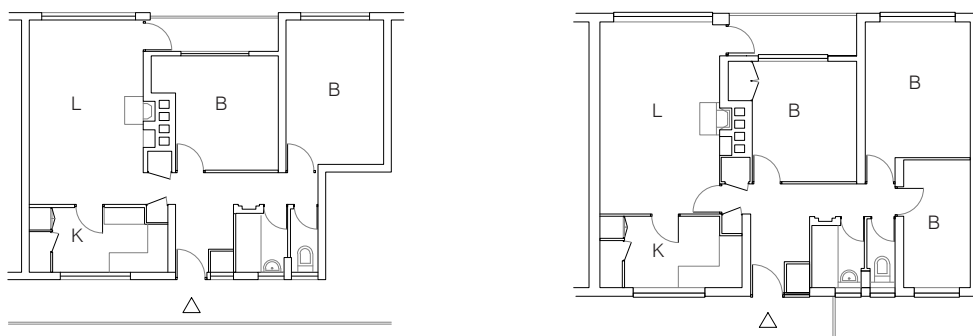


Fig.30
Proposed Flat Plans
2-3 bedroom Flat Type Plan,
London County Council, Housing Type Plans, 1956

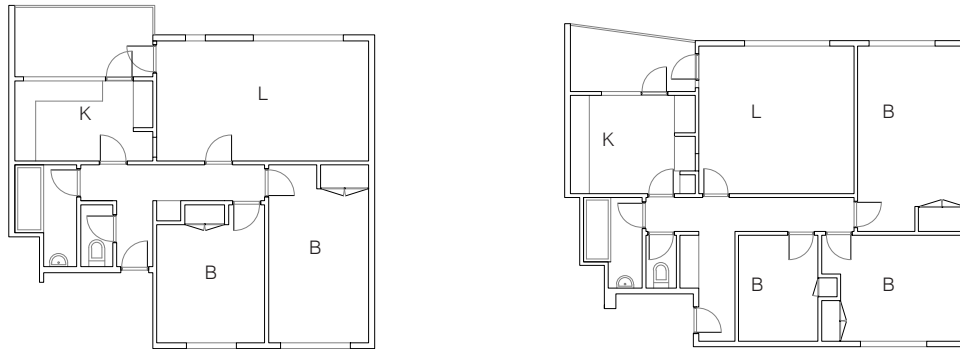


Fig.31
First Floor Plans
2-3 Bedroom Flats, Churchill Gardens, Pimlico, 1962,
Philip Powell and Hidalgo Moya

0 1 2 5

The subsequent *Housing Manual* of 1949 tackled the need for a long-term and more diverse housing programme by considering the different needs of single dwellers, young families, elders, and people with disabilities in their recommended room and dwelling sizes (Fig. 27). Space standards reached an all-time high in 1949.¹⁰³ Compared with the suggested 74.3-83.6 m² for three-bedroom homes in the 1944 edition, the 1949 manual proposed larger homes in the range of 83.6 to 88.3 m².¹⁰⁴ The manual was later supplemented by four important documents that promoted houses over flat typologies: *Technical Appendices* (1951), *Housing for Special Purposes* (1951), *Houses: 2nd Supplement* (1952) (Fig. 25), and *Houses: 3rd Supplement* (1953). Adding to these documents, a new set of standard plans were developed in 1956 by the Housing Division of the Architect's Department of the LCC (Figs. 26 and 30). The *Housing Type Plans* comprised a set of 39 type plans for dwellings with 1 to 5 bedrooms, organised into three- to five-storey blocks of flats with deck access, three-storey blocks of flats accessed via a staircase, maisonettes (four- and 11-storey), terraced houses with narrow and medium frontage, and houses for the elderly. These design manuals incorporated many post-war improvements to the design of housing such as back boilers being replaced by immersion heaters, all bathrooms fitted with toilets, buildings equipped with lifts, and deck access replaced by internal staircases and corridors.

103.
Park, p. 21.

104.
Ministry of Health and Ministry of Works, *Housing Manual* (London: Ministry of Health and Ministry of Works, 1949).

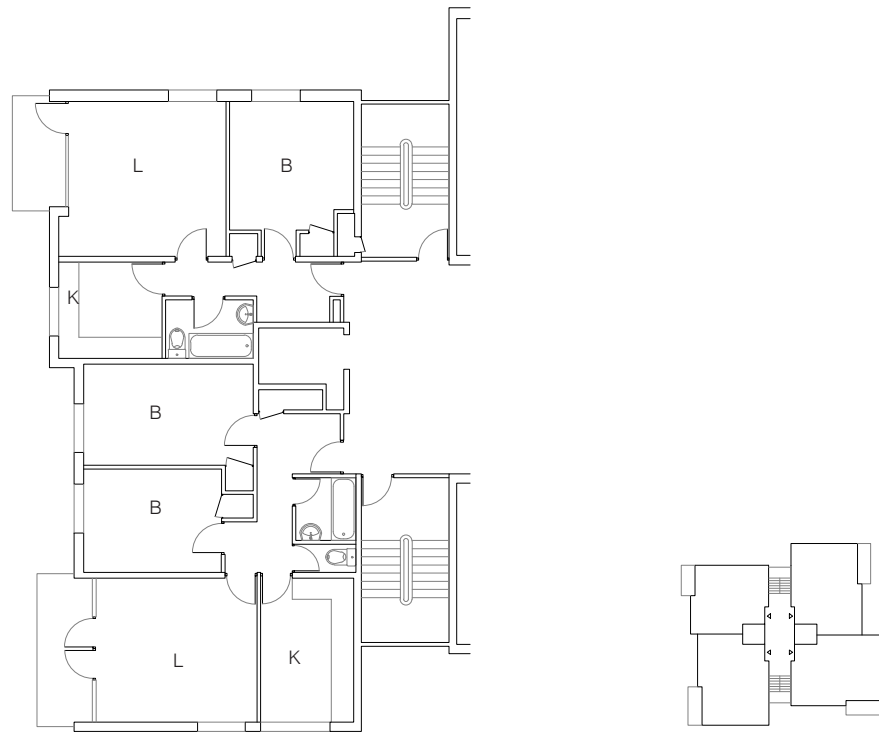


Fig.32
First Floor and Point Block Plan
1-2 Bedroom Flats, Alton East, Roehampton, 1958
London County Council, Rosemary Stjernstedt

0 1 2 5

105.
Manoochehri, p. 247.

106.
Ian Colquhoun, *RIBA Book of British Housing: 1900 to the Present Day* (London: Architectural Press, 2008), p. 150.

107.
GLC and Campbell, p. 48.

108.
Ibid.

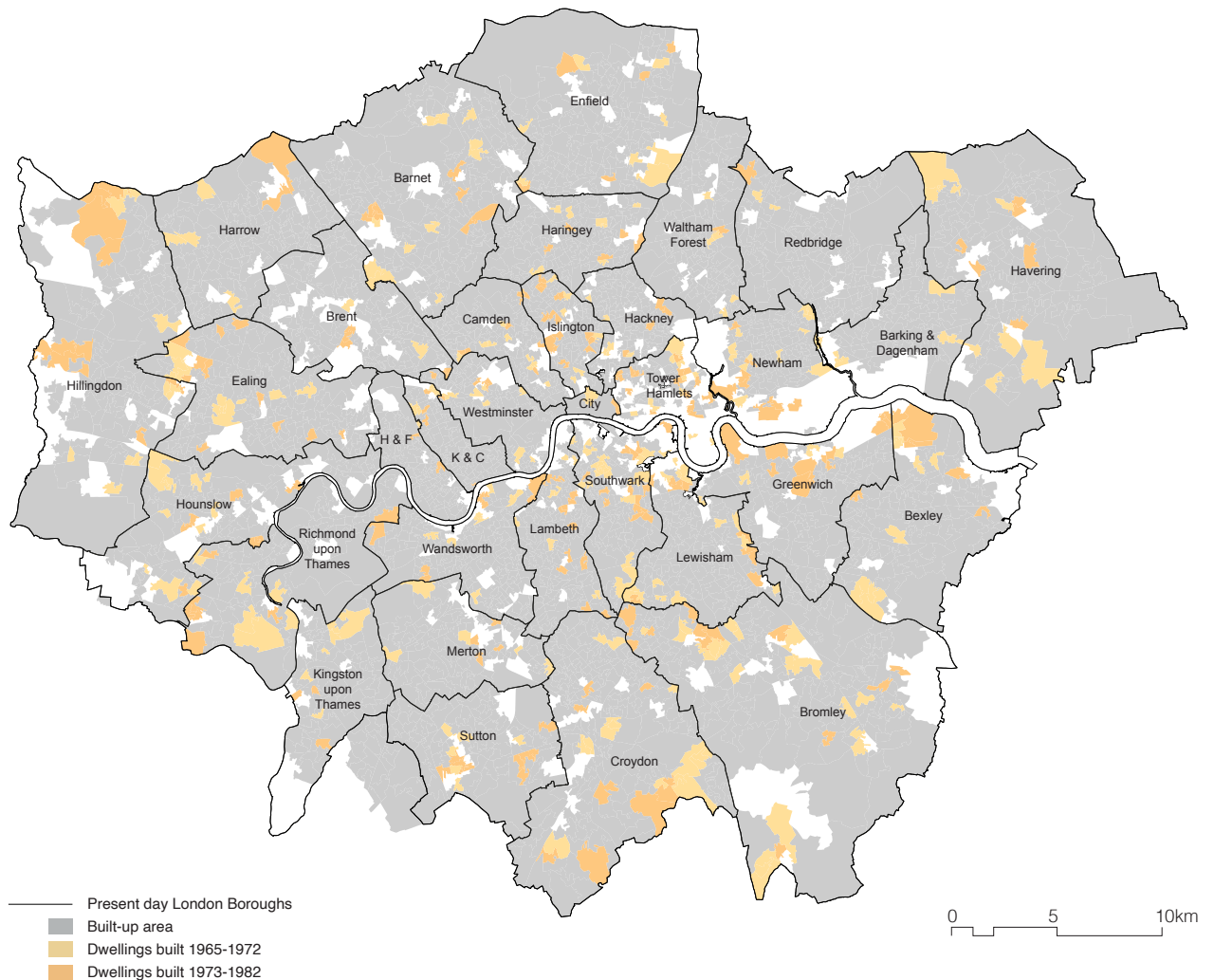
109.
Miles Glendinning and Stefan Muthesius, *Tower Block: Modern Public Housing in England, Scotland, Wales and Northern Ireland* (Yale University Press, 1994), p. 31.

Churchill Gardens (1954) in Pimlico by Powell & Moya is an example built to the minimum space and density standards for dwellings of the 1949 version of the *Housing Manual* (Fig. 31).¹⁰⁵ The project rejected surrounding traditional housing forms and is made up of predominantly seven- to nine-storey tall blocks of flats with wide frontages to maximise sunlight and ventilation, but also includes three-storey terraces and smaller four-storey maisonette flats.¹⁰⁶

In the post-war years, mixed-use housing developments gained momentum with the introduction of point and slab blocks, which freed up the ground and allowed for the provision of open green spaces alongside lower-density housing (maisonettes and terraced housing).¹⁰⁷ Mixed-use development was tested at a large scale by the LCC in 1953 at the Ackroydon Estate in Wimbledon.¹⁰⁸ But, 11-storey point blocks with three flats per floor proved not to be economic due to the cost of mechanical lifts – something that would be improved in 1951 at the Alton East estate in Roehampton with four flats per floor (Fig. 32).¹⁰⁹

1960-1980

The Parker Morris Report (1961) and Preferred Dwelling Plans (1977)



During the 1960s, new administrative bodies were formed and several noteworthy housing design guides were published. The Housing Act of 1964, for example, established the Housing Corporation as a body tasked with regulating housing associations and allocating funds for new housing projects. In 1965, The Greater London Council (GLC) was established by the London Government Act of 1963 to create one governance body for the entire metropolitan area of London. The previous 28 London Metropolitan Boroughs were reduced to 12 and outer urban areas were added to make up a total of 32 boroughs.

Dwelling Type	Number of People (i.e. bed spaces) per dwelling (m ²)					
	1	2	3	4	5	6
3-storey house	-	-	-	-	93.8	97.5
2-storey house (centre terrace)	-	-	-	74.3	84.5	92
2-storey house (semi/end terrace)	-	-	-	71.5	81.8	92
Maisonette	-	-	-	71.5	81.8	92
Flat	29.7	44.6	56.7	69.7	79.0	86.4
Single Storey House	29.7	44.6	56.7	66.8	75.2	83.6

Storage						
Houses	2.8	3.5	4.1	4.6	4.6	4.6
Flats & Maisonettes	0.7 (1.8)	0.9 (1.8)	1.1 (1.8)	1.4 (1.8)	1.4 (1.8)	1.4 (1.8)

Table 4
Provision of Space and Rooms according to Dwelling Type
Parker Morris Committee, Parker Morris Report, 1961

The Parker Morris Committee's report *Homes for Today and Tomorrow* was published in 1961 for the Ministry of Housing and Local Government. Appointed by the Central Housing Advisory Committee, the Parker Morris Committee included a multi-disciplinary team of planners, architects, surveyors, doctors, engineers, and local authority housing officials.¹¹² In early 1959, at the request of local authority associations, the committee prepared a questionnaire for their members as well as other organisations.¹¹³ For two years, the committee gathered and analysed collected data, visited 600 houses and flats built since the war¹¹⁴, and reviewed written and oral evidence from eighty bodies and people. Evidence was submitted by public sector experts including 76 local authorities, housing experts (RIBA, Housing Centre Trust), and health professionals (Royal Society of Health), but also housing charities (Guinness Trust), women's associations, house-builders and the commercial sector such as the Furniture Development Council and British Refrigeration Association.

The report made recommendations on minimum housing standards including the total floor area for particular dwelling typologies. However, it not only focused on dimensions and areas but also on a space's usability, proposing better public and private sector housing, including properties for-sale and to-let. Dwellings were to be designed to meet changes in consumption over time and the various activities associated with different family households. As many families now owned modern household

112.
Among the members was architect Judith Ledeboer, who was also part of the Dudley Committee for the Design of Dwellings.

113.
Parker Morris Committee, *Parker Morris Report: Homes for Today and Tomorrow* (London: Ministry of Housing and Local Government, 1961), p. 2.

114.
In London, dwellings visited by the committee included estates by the LCC, the City of Westminster, the boroughs of Paddington and Wandsworth, and some private housing.

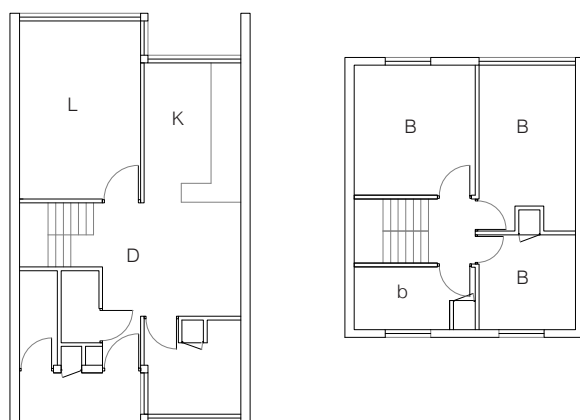


Fig.34
Ground and First Floor Plan
3 Bedroom House, Ravenscroft Road, West Ham, 1964,
Ministry of Housing and Local Government



inventions such as vacuum cleaners, refrigerators, washing machines, and various other electrical appliances, more space was needed. The report thus stated that: 'Additional space is comparatively cheap, for the cost is not loaded with heavy overheads such as plumbing and equipment, and so may amount to much less than the average cost per square foot. Additional space is also an important long-term investment, for if a house or flat is large enough it can usually be brought up-to-date as it gets older.'¹¹⁵

115.
Parker Morris Committee, p. 2.

However, the newly proposed total floor areas did not exceed those given by the *Dudley Report* in 1944. Yet the *Parker Morris Report* significantly raised recommended housing densities from the post-war standard of 13 dwellings to 30 dwellings per acre. By 1969, the Parker Morris space standards became compulsory for new council housing until they were abolished in 1980.¹¹⁶ In this period, funding and subsidies for new public housing developments were calculated based on the Housing Cost Yardstick and in relation to the Parker Morris standards, despite the reports minimum space standards eventually becoming treated as a maximum by housebuilders.¹¹⁷

116.
Park, p. 24.

117.
Colquhoun, p. 15.

Ravenscroft Road in West Ham is an example of a development designed to the principles and recommendations of the *Parker Morris Report* (Fig. 34).¹¹⁸ It has a range of different dwelling types at various sizes – slightly above the Parker Morris minimum standards – with every house providing a spare bed space that could be used by visitors or to enlarge the living room.¹¹⁹ In

118.
David Crawford, ed., *A Decade of British housing, 1963-1973* (London : Architectural Press, 1975), p. 43.

119.
Ibid.

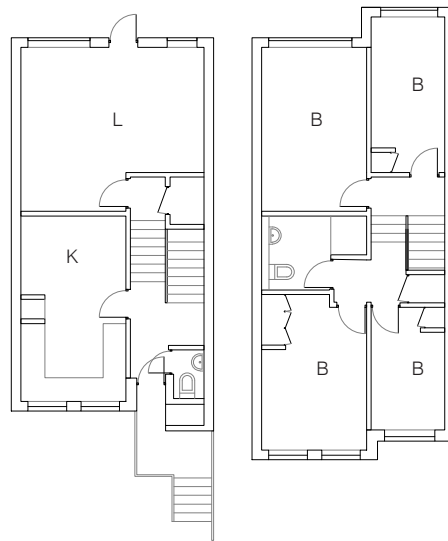


Fig.35
Ground and First Floor Plan
4 Bedroom Maisonette, Lillington Gardens, Westminster, 1971,
Roger Westman

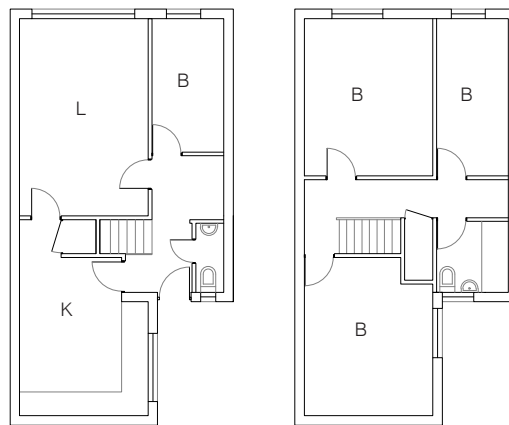


Fig.36
Ground and First Floor Plan
4 Bedroom Type Maisonette
Greater London Council, Preferred Dwelling Plans, 1977

0 1 2 5

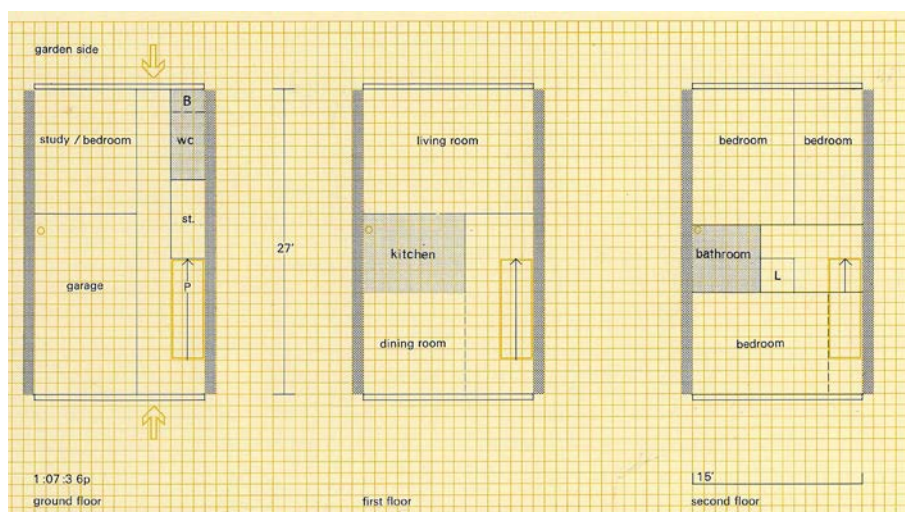


Fig.37
Ground, First and Second Floor Plan
3 Bedroom-3 Storey House Type
National Building Agency, *Generic Plans: Two and Three Storey Houses*, 1965.

contrast, Lillington Gardens built by Westminster City Council in 1961, did not entirely meet the Parker Morris standards even though it was highly praised for creating ‘an exciting environment for young and old’ (Fig. 35).¹²⁰ Although the project was constructed between 1964 and 1972, it had been designed in 1959 before the Parker Morris standards coming into force, demonstrating the delay space standards can have on the housing stock. However, while its maisonettes were 1.3-5.5% less the recommended floor area for 5-6-person dwellings, 3-person maisonettes exceeded the Parker Morris standards by 7.6%.¹²¹

The Parker Morris standards led to several directly related publications and design manuals. In 1965, the National Building Agency published the design bulletin *Generic Plans: Two and Three Storey Houses* containing standard plan solutions determined in their dimensions by industrial construction methods (Fig. 37).¹²² Another influential design guide was *Design Bulletin 6: Space in the Home* (1968) by the Ministry of Housing – a supplement to the *Homes for Today and Tomorrow* report – that based on the analysis of the daily activities in a family and its changes over time, proposed essential furniture and space requirements. It provided the standard dimensions of the furniture and anthropometric data for the space needed to both use and move such furnishings. The bulletin translated these dimensions into standardised plans for terraced housing. Both the designs proposed by the *Parker Morris Report* and design bulletins made normative assumptions

120.
The two later phases had to comply with the housing cost yardstick. See, Colquhoun, p. 154.

121.
Manoochehri, p. 249.

122.
National Building Agency, *Generic Plans: Two and Three Storey Houses* (London: National Building Agency, 1965), p. 3.

Fig. 1. The younger family
(Parents and three children: a boy of school age (7) and girls of 3 and 1)































0700	In the early morning rush, instant hot water and warmth are needed.					
0710	Breakfast has to be served quickly, the school child got ready and the other children looked after as they wake up.					
0830	Father and school child are off. Mother gives the other children their food and has something herself. A place where food can be eaten near the work area is useful.					
0930	Mother puts the baby out in the pram and the toddler plays outside. The toddler wanders in and out of the house. Mother needs to be able to see the children easily while she works.					
1130	Coming back from shopping loaded up, Mother needs space to put the pram and the shopping and elbow room to take off the children's outdoor clothes, and somewhere convenient to put them.					
1200	When the children play indoors Mother needs to be able to see them from the kitchen, but they should be away from the kitchen equipment and not under her feet.					
1230	When the family comes home to dinner on week days they have to wash and eat quickly. The dining space should be conveniently reached from the work centre.					

Fig.38
Activities of the Nuclear Family
Ministry of Housing, Design Bulletin 6: Space in the Home, 1968

about daily routines in domestic space, with the range of activities considered all based on a typical nuclear family household (Fig. 38).¹²³ The standardised plans were thus determined by a combination of normative activities such as: 'Coming back from shopping loaded up, Mother needs space to put the pram and the shopping, and elbow room to take off the children's outdoor clothes, and somewhere convenient to put them', and the typical furniture and spaces needed for these activities.'¹²⁴

The peak of housing construction by the government was reached in 1968, with 420,000 homes built that year.¹²⁵ This required several innovations in construction methods such as prefabrication and the use of new materials like concrete, which permitted the erection of taller buildings. One of the first industrial building systems employed in the UK was the Danish Larsen-Nielsen system at Morris Walk in Greenwich (1964), whose range of three- and ten-storey buildings used concrete panels.¹²⁶ However, there was also growing dissatisfaction with the post-war reconstruction programme and public disapproval of tower blocks, while local authorities realised the high long-term maintenance cost and challenges of cheap building materials.¹²⁷ Criticism often centred around the inhumane scale of point blocks and the social isolation they created, especially for families with children.¹²⁸

In 1977, the GLC Department of Architecture and Civic Design published *Preferred Dwelling Plans*, a design bulletin with 38 standard housing layouts (Fig. 36, 41, 42). The plans sought to reduce wasteful duplication of design work by combining structural standardisation with a flexible interior dwelling layout that met the Parker Morris standards. The dwelling typologies were divided into efficiently planned houses with a garden for families and two-person flats with ample storage, both no higher than three storeys.¹²⁹ Internal elements such as kitchens, bathrooms, and staircases were standardised, with working drawings included for housebuilders. The intention of the standardised plans was not to eliminate the architect but to reduce the time needed in the early stages of planning, so the architect could 'spend more time on the architectural treatment of the exterior of the dwelling'.¹³⁰

At the same time, new housing regulations dealing with the accessibility of dwellings were adopted, with the Department of the Environment publishing two papers on mobility within the home and requirements for wheelchair access.¹³¹ In addition, the advent of the Housing Finance Act of 1972 saw rents increase due to reduced council housing subsidies and the replacement of 'controlled' or 'fixed' rents with 'fair' rents.¹³² Fair rents, also known as 'secure' tenancy, are the maximum amount that a tenant may be reasonably expected to pay for a property and are officially determined and registered by a rent officer.¹³³ By the end of the decade, the state began to withdraw from the provision of council housing while encouraging a private housing market.¹³⁴ After council housing suffered public expenditure cuts, house building fell from 173,800 in 1975 to 80,100 in 1979.¹³⁵

123. Parker Morris Committee, pp. 49-50.

124. Ministry of Housing and Local Government, *Design Bulletin vol. 6: Space in the Home*, (London: Ministry of Housing and Local Government, 1963), p. 4.

125. Greeves and Woodman, p. 72.

126. The Danish Larsen-Nielsen System used large concrete panels.

127. NHBC, p. 10.

128. Amplifying the notoriety of point blocks, a gas explosion in 1968 at the newly-built Ronan Point – a prefabricated 23-storey tower block – caused its partial collapse and death of four residents.

129. Park, p. 24.

130. Greater London Council, *Preferred Dwelling Plans* (London: Architectural Press, 1977), p. 7.

131. Park, p. 25.

132. 'Conservative and Labour Legislation', The Cabinet Papers, The National Archives <<https://www.nationalarchives.gov.uk/cabinetpapers/themes/conservative-labour-legislation.htm>> [accessed 15 January 2020].

133. Rent regulation applied to the UK private-sector rental market from 1915 to 1980. A fair rent may be lower than the market rent.

134. Manoochehri, p. 41.

135. Paul N. Balchin and Maureen Rhoden, *Housing: The Essential Foundations* (London and New York: Routledge, 1998), p. 17.

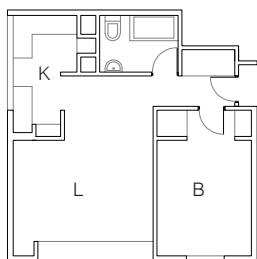


Fig.39
Floor Plan
1 Bedroom Flat, Canada Estate, Bermondsey, 1962,
Greater London Council, Hubert Bennett

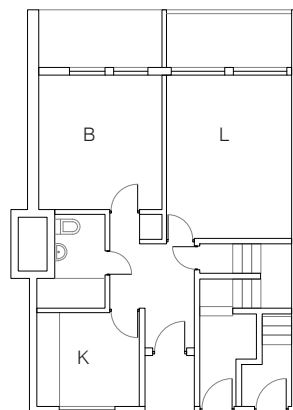


Fig.40
Floor Plan
1 Bedroom Flat, Trellick Tower, Kensal Town, 1972,
Erno Goldfinger

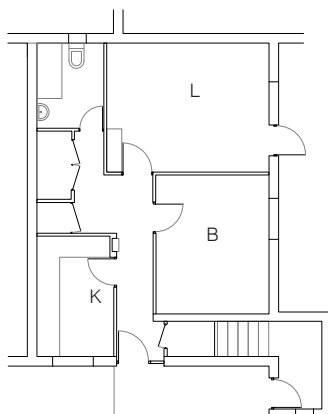


Fig.41
Floor Plan
1 Bedroom Flat Type
Greater London Council, Preferred Dwelling Plans, 1977

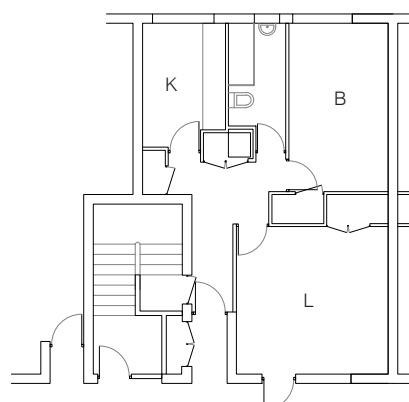


Fig.42
Floor Plan
1 Bedroom Flat Type
Greater London Council, Preferred Dwelling Plans, 1977

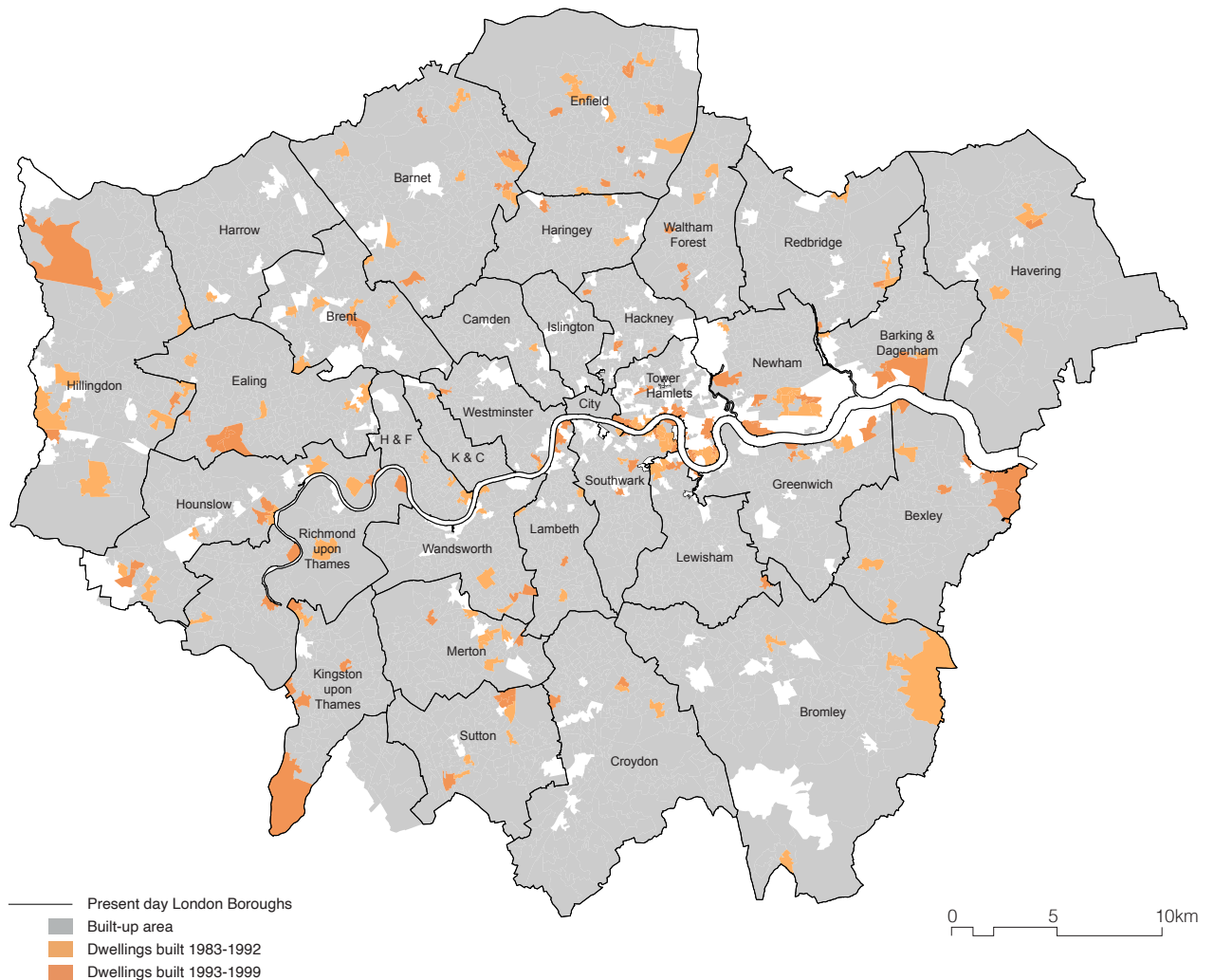
0 1 2 5

Room Description	Number of People (i.e. bed spaces) per dwelling (m ²)						
	1	2	3	4	5	6	7
Main Bedroom	8	11	11	11	11	11	11
Other Double Bedroom	-	10	10	10	10	10	10
Single Bedroom	-	6.5	6.5	6.5	6.5	6.5	6.5
Dining Kitchen	8	9	11	11	12	13	14
Galley Kitchen	5.5	5.5	5.5	7	7	8.5	9
Living Room (without kitchen/diner)	11	12	13	14	15	16	17
Living Room (with kitchen/diner)	13	13	15	16	17.5	18.5	20

Table 5
Provision of Space and Rooms according to Number of People per Dwelling
Greater London Council, Preferred Dwelling Plans, 1977

1980-2000

Housing Act of 1980, Design and Contract Criteria (1983), and Lifetime Home Standards (1991)



In contrast to the 1960s, in which housing standards increased, the 1980s saw the government withdraw from the use of space standards and left it to the market to determine dwelling sizes.¹³⁶ In addition, the Housing Act of 1980 by the government of Margaret Thatcher gave council tenants with a minimum three-year history of tenancy the right to buy their homes at significant 30-50% discounts of the property value. Under the Right to Buy scheme, between 1979 and 1987 more than a sixth of the total council housing stock was sold.¹³⁷ Those unable to purchase their homes were given the option to transfer ownership to private landlords or housing associations. The privatisation of council housing led to a marginalisation of lower-income groups, as the shrinking stock of council houses and a 'cherry-picking' of better properties by private buyers only left reduced access

136.
Manoochehri, p. 45.

137.
Ibid, 42.



Fig.43
Design for Elderly Users
John Noble (Department of the Environment), *Activities and Spaces*, 1982

138.
Richard Disney and Guannan Luo,
*The Right to Buy Public Housing in
Britain: A Welfare Analysis* (London:
Institute for Fiscal Studies, 2016),
p. 12.

139.
Subsidies paid by local authorities to
cover council tenants fell from £2.1
billion in 1980 to £1.2 billion in 1990.
See Malpass and Murie, p. 48.

140.
Park, p. 25.

to lower quality council housing.¹³⁸ With the Right to Buy scheme local authorities had significantly reduced maintenance costs and the subsidising of many rents, however, they received little from sales of council housing. At the same time, the number of applicants for council housing due to homelessness increased from 63,000 in 1980 to 146,000 in 1990.¹³⁹

While many councils transferred their housing stock to housing associations to reduce public expenditure, there was also a significant decrease in the production of new council housing, with new funding regulations prioritising cost efficiency over housing quality.¹⁴⁰ In the 1980s, housing associations became, therefore, the main providers of what had now become effectively 'social housing' for those with special needs or vulnerabilities who were not served by the market, replacing more widely accessible government-provided public housing. This came with new design standards, the *Design and Contract Criteria* (1983) by the Housing Corporation that took the place of the Parker Morris standards abolished three years earlier.

In 1982, John Noble from the Department of the Environment published two influential documents on housing standards in the private sector, *Activities and Spaces*, and *Dimensional Data for Housing Design* (Fig. 43). While based on the Parker Morris minimum space standards and including the furniture dimensions featured in the *Design Bulletin 6*, they also considered a wider range of furniture and activities for more diverse user needs, including recommendations on how to design for elderly users. In addition, new

No. of Rooms	No. of People
1	2
2	3
3	5
4	7.5
5 or more	2 for each room

Floor Area of Room (m ²)	No. of People
10.22	2
8.36-10.22	1.5
6.5-8.36	1
4.65-6.5	0.5

Table 6
Provision of Space and Rooms according to Number of Inhabitants
UK Government, Housing Act, 1985

housing standards proposed by the National House Builders Registration Council (NHBC) established minimum bedroom sizes and storage spaces, with double bedrooms to be no less than 9 m² and have a minimum width of 2.7 m, with smaller bedrooms classified as ‘one bed spaces’. But these low space standards were too small even for the market. A few years later, the NHBC space standards were discontinued as small homes proved difficult to sell.¹⁴¹

One important way of encouraging major investment within London was to create urban development corporations and use funding from non-departmental public bodies (NDPBs), such as the London Docklands Development Corporation, London Thames Gateway Development Corporation, and London Development Agency.¹⁴² The London Docklands Development Corporation, for example, was an urban regeneration housing scheme encouraged by the government but realised by the private sector. After the docks closed in 1980, the corporation was established through the Local Government, Planning and Land Act of 1980, with Urban Enterprise Zone status granted in 1982.¹⁴³ The development area consisted of over 600 acres of public land and was intended for the supply of public housing, however, of the 2,819 housing units built on the Isle of Dogs, only 22 were for shared ownership and 60 for rent (Fig. 44-45).¹⁴⁴ Despite the total construction of 4,000 new homes in the Docklands area and attraction of 400 companies, few jobs were created by the Docklands, as the majority of companies had simply relocated from central London.¹⁴⁵

141. ‘Scrutiny Investigation on Room Sizes in New Developments’, Findings and Recommendations, Croydon Council <<https://www.croydon.gov.uk/sites/default/files/articles/downloads/investigation1.pdf>> [accessed 30 January 2020].

142. A non-departmental public body (NDPB) is defined by the government as: ‘a body which has a role in the processes of national government, but is not a government department or part of one, and which accordingly operates to a greater or lesser extent at arm’s length from ministers’.

143. ‘What are Enterprise Zones?’, About, Enterprise Zones <<https://enterprisezones.communities.gov.uk/about-enterprise-zones/>> [accessed 5 January 2020].

144. Hobhouse, p. 31.

145. Porter, p. 379.

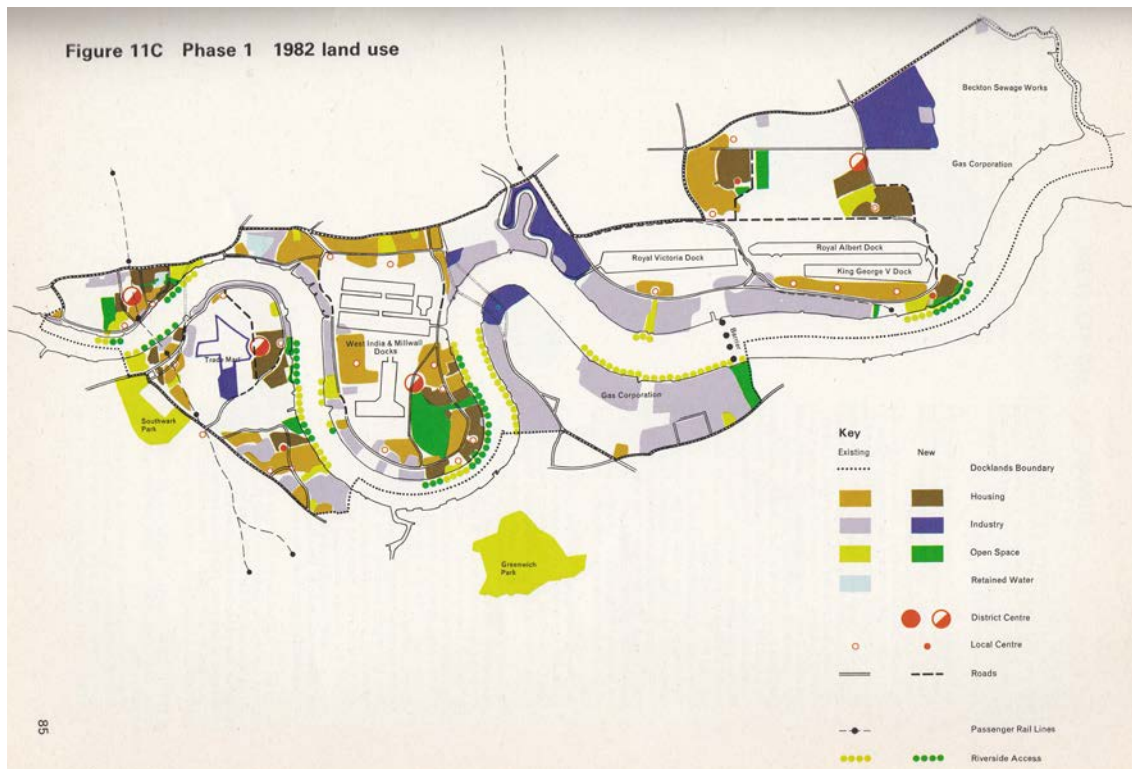


Fig.44
London Docklands Development Phases 1&4, 1982 to 1997.

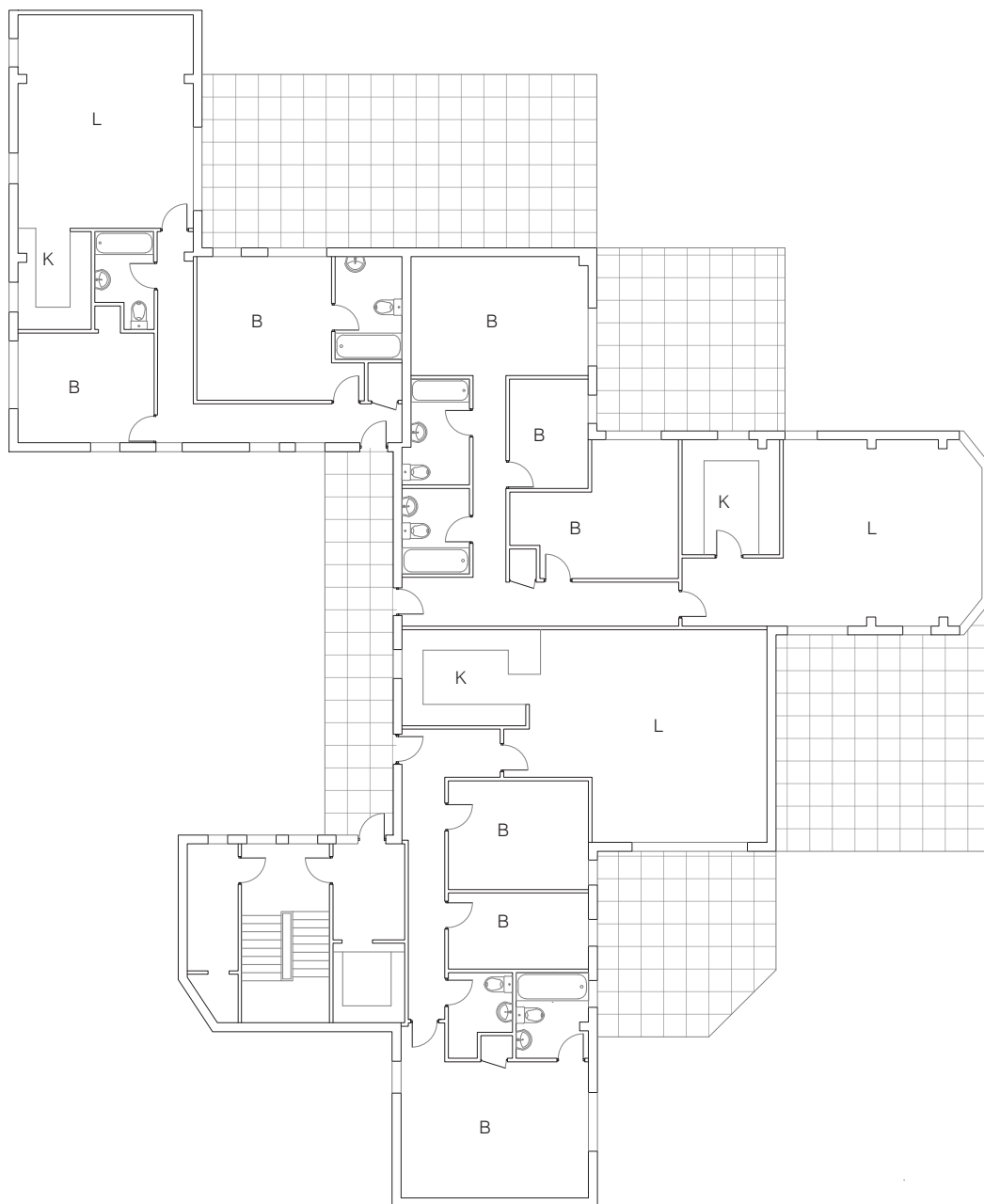


Fig.45
 First Floor Plan
 2-3 Bedroom Flats, Cumberland Mills, Isle of Dogs, 1988,
 Greater London Council, Donald Ball

0 1 2 5

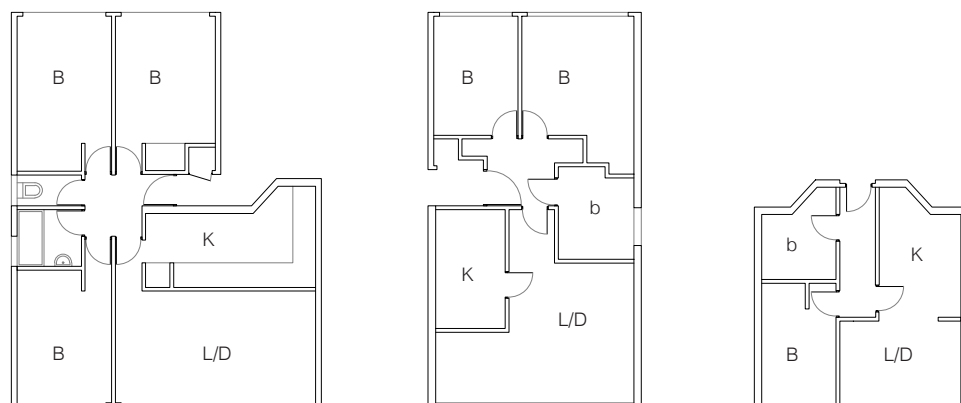
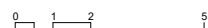


Fig.46
First Floor Plans
1, 2, and 3 Bedroom Flats, Camden Gardens, 1993,
London Community Housing Association, Jestico and Whiles



In 1988, Canary Wharf was developed by the Canadian company Olympia & York to a masterplan by Skidmore, Owings & Merrill.¹⁴⁶ In favour of such developments, the Housing Act 1988 abandoned rental controls and permitted housing associations to receive mixed funding. By defining housing associations as non-public bodies, the act gave them access to private funding while incentivising the transfer of existing public housing stock to housing associations due to severe public funding cuts.¹⁴⁷ The act further provided a framework for Housing Action Trusts (HATs) to take over council housing in designated areas with serious housing and social problems.¹⁴⁸ The HATs would take on the responsibility to repair and improve the housing stock as well as the general built environment, and at the end of the trust's life (5 years), tenants could choose whether their estates should be managed by a local authority, housing association, or private landlord.

146.
Ibid, 376.

147.
'The Evolution of Stock Transfer Housing Associations', Joseph Rowntree Foundation <www.jrf.org.uk/report/evolution-stock-transfer-housing-associations> [accessed 31 January 2020].

148.
Nirmala RAO, *The Changing Role of Local Housing Authorities: An Interim Assessment* (York: Joseph Rowntree Foundation, 1991), p. 39.

By the early 1990s, a decline in housing standards was apparent. Karn and Sheridan's study *New Homes in the 1990s* compared dwelling sizes built in 1991–92 by housing associations and the private sector, showing that both provided housing at 5 to 15% below the Parker Morris standards. More than half of the projects with lower standards were built by housing associations.¹⁴⁹ In response to this, the Housing Corporation (HC) published its *Scheme Development Standards* (SDS) in 1993 for subsidised housing, which defined minimum housing standards as before in regards to required furniture arrangements, circulation spaces, relations between rooms, and noise transmission. It would later be replaced by the Design and Quality Standards (2007).¹⁵⁰ The Housing Corporation funding system was largely based on criteria set out in 1993 by the Total Cost Indicators (TCIs), including a combination of land and property costs. TCIs were divided into 'unit type' and 'cost group area categories' and determined funding eligibility as well as grant sizes.¹⁵¹

In 1997, TCIs were replaced by the Housing Quality Indicators (HQI) that sought to quantify current housing standards and provided a new assessment and measurement tool to evaluate housing schemes based on quality and cost, rather than cost exclusively.¹⁵² In this context, the term 'affordable' housing emerged in the late 1990s, as the provision of social housing was increasingly privatised and failing due to being overly market-driven.¹⁵³ Built in 1993, Camden Gardens by the Community Housing Association – providing 27 dwellings in three-storey terraced houses and flats – is an early example of a so-called affordable housing scheme (Fig. 46).

To further safeguard housing quality, the National Housing Federation and Housing Association Training & Consultancy (HATC) published the *Standards and Quality in Development: A Good Practice* (1998), which differentiated between concepts of 'essential' and 'desirable' criteria and highlighted, for example, that bedrooms should be large enough to accommodate a bed. Although its suggestions were not mandated as a funding requirement, its discretionary good practice guidance was widely adopted by housing associations.¹⁵⁴

In the same period, research by the Joseph Rowntree Foundation and the Lifetime Home Standards (1991) raised awareness of housing design requirements for people with disabilities. The *Lifetime Home Standards* presents a series of sixteen design criteria to make homes more adaptable to different stages of life at a minimal cost. By 1999, these design standards were in parts incorporated into Part M of the Building Regulations (Access and Use of Buildings).

149. Valerie A Karn and Linda Sheridan, *New Homes in the 1990s: A study of design, space and amenity in housing association and private sector production* (York: Joseph Rowntree Foundation and the University of Manchester, 1994), p. 15.

150. Park, p. 30.

151. David Cowan, *Housing Law and Policy* (Cambridge: Cambridge University Press, 2011), p. 112.

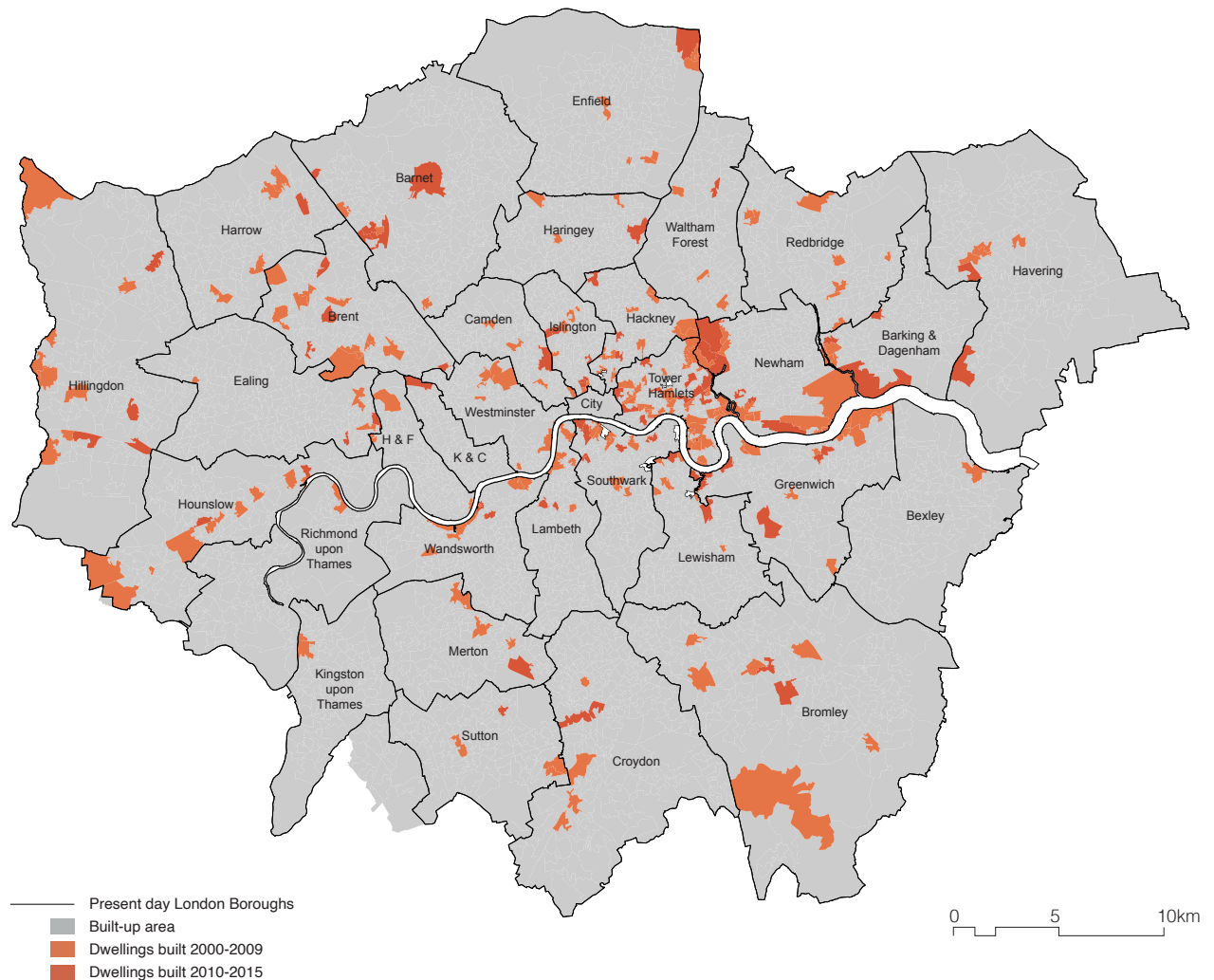
152. 'Housing Quality Indicators', Homes and Communities Agency <<https://www.gov.uk/guidance/housing-quality-indicators>> [accessed 15 January 2020].

153. The National Affordable Homes Agency, *721 Housing Quality Indicators (HQI)*, (London: Housing Corporation, 2007).

154. Park, p. 30.

2001-present day

London Housing Design Guide (2010), Nationally Described Space Standard (2015), and Supplementary Planning Guidance



In 2001, the UK saw its lowest level of new homes built per annum since the end of World War II.¹⁵⁵ From 2001 to 2010, only 144,000 new homes were completed annually on average, 100,000 fewer than in the 1970s.¹⁵⁶ At the same time, average house prices doubled from 2000 to 2005.

When the Greater London Council was abolished in 1986, most of its powers were transferred to individual London boroughs until the Greater London Authority (GLA) was established in 2000. The GLA, however, was markedly different from the GLC, as it was made up of the London Assembly and the city mayor. As elected Prime Minister, Tony Blair set up the Urban Task Force to rethink urban policy and set the foundations for planning and design when Ken Livingstone was elected as the first Mayor of London in 2000. The

155. Greeves and Woodman, p. 92.

156. Housing in England: Overview, Department for Communities and Local Government <<https://www.nao.org.uk/wp-content/uploads/2017/01/Housing-in-England-overview.pdf>> [accessed 15 January 2020].

157.
Richard George Rogers, *Towards an Urban Renaissance: Final Report of the Urban Task Force* (London: Taylor & Francis, 2004).

158.
The OAs include Canada Water, Battersea, the Royal Docks, White City, Croydon, and Bromley. According to the London Plan (2015), these OAs have the potential to provide 300,000 new homes.

159.
Duncan Bowie, *Politics, Planning, and Homes in a World City* (New York, NY: Routledge, 2010), p. 123.

160.
Park, p. 31.

161.
GLA and HATC, p. 32.

162.
Park, p. 31.

163.
In the first phase, 98,000 homes were built, with 30,600 within London. The target was increased to 160,000 by 2016 without stating how many new homes per region.

164.
In Stratford, the main housing development site for 4,500 homes had already been granted planning permission before London was selected as the host of the Olympics in 2012.

165.
Bowie, p. 145.

Urban Task Force, chaired by architect Richard Rogers, published *Towards an Urban Renaissance* (2004), a report proposing strategies to repopulate London's major city centres and promoted tax relief incentives to develop brownfield sites for housing.¹⁵⁷ These recommendations were taken up by the *Planning Policy Guidance 3: Housing* in 2000 by the Department for Communities and Local Government. To meet the high demand for housing, 37 new Opportunity Areas (OAs) were defined in the London Plan (2004).¹⁵⁸ These were 'brownfield sites with significant capacity for development – such as housing and the accommodation of jobs, homes, facilities, and infrastructure.

In 2006, Ken Livingstone commissioned the Housing Association Training & Consultancy (HATC) led by Andrew Drury with architects Levitt Bernstein to write a report on housing space standards.¹⁵⁹ It was built on previous research such as the *What Home Buyers Want* (2005) by the Commission for Architecture and the Built Environment (CABE) who undertook consumer surveys and focus groups.¹⁶⁰ The HATC report *Housing Space Standards* (2006) showed that space standards in the UK's new developments were below those in other European countries. The report also pointed out the poor match between London's demographics, homebuyers' preferences, and the dwellings they were provided with.¹⁶¹ It thus proposed a set of space standards for room sizes according to the number of occupants – for example, 37 m² for one person, 44 m² for two, and 57 m² for three – as well as minimum floor areas for cooking, eating, living, and storage. Not long after, the English Partnerships, established in 2005 as the national regeneration agency for England, published their standards titled *Places, Homes, People* (2007) based on Building for Life criteria. The standards were higher than those in the HATC report, however, they only covered five dwelling typologies and did not differentiate between houses and flats or different building storey heights (Fig.47).¹⁶²

Since 2000, issues of sustainability in architecture have been increasingly debated, leading to new housing standards within. Established in 2002 by the mayor, the London Sustainable Development Commission brought together experts to promote sustainable development and assess the compliance of initiatives such as the Climate Change Agency (2005) and the Congestion Charging Zone with sustainable development principles. The government's Sustainable Communities Plan (2003) identified the Thames Gateway as a growth area with the potential of accommodating 160,000 new homes.¹⁶³ The government subsequently established the London Thames Gateway Development Corporation (LTGDC) with powers over development control for the main sites within London's administrative area including Stratford, Greenwich, Barking, and Dagenham.¹⁶⁴ With a similar role and make-up to the London Docklands Development Corporation, the corporation's appointed board was, however, not accountable to local boroughs.¹⁶⁵

Quality Standards Checklist

Quality Places	Design statements	Design statement adhering to the principles of UDC and UDC2	
	Building for Life	Building for Life Silver (or Gold)	
	Inclusive design	Access statement, taking an inclusive approach to design and adhering to the principles of inclusive design guidance note	
	Secured by Design	Developments designed by Secured by Design principles and accredited by the local constabulary	
	Integration of tenure	Tenure-blind development (maximum 6 social units together)	
	Car parking	Local authority minimum is English Partnerships' maximum Design in accordance with <i>Manual for Streets</i> and <i>Car parking: what works where</i> guides	
Quality Homes and Buildings	Code for Sustainable Homes and BREEAM	Code for Sustainable Homes Level 3 minimum for housing (later phases may be higher) and BREEAM Very Good for commercial or other building types	
	Lifetime Homes	All 16 standards for Lifetime Homes must be achieved	
	Noise	Airborne sound attenuation 5dB higher than Approved Document Part E Impact sound attenuation 5dB lower than Approved Document Part E	
	Building specifications	Specifications between A*-C only from BRE <i>Green Guide to Specification</i> and <i>Green Guide to Housing Specification</i>	
	Overheating	Testing required on overheating – for living areas <1 per cent of occupied hours are over an operative temperature of 28°C. Bedrooms <1 per cent of occupied hours are over 26°C	
	Space standards	1 Bed/2 person homes	51 sq m
		2 Bed/3 person homes	66 sq m
Construction Quality		2 Bed/4 person homes	77 sq m
		3 Bed/5 person homes	93 sq m
		4 Bed/6 person homes	106 sq m
		also requirements for room dimensions and balconies	
	Fire safety	Statement of fire safety	
Construction Quality	Construction efficiency	Construction efficiency statement outlining how developers have used lessons of the Design for Manufacture Competition and how new technologies improve the quality and deliverability of the scheme – detail on lending, insurance and consumer warranties	
	Re-use of resources	Land remediation and demolition statements (where relevant) Site waste management plan Re-use of existing buildings and materials where possible	
	CEEQUAL	Very Good for construction quality	
	Health and safety	Health and safety plan and Construction Design and Management (CDM) co-ordinator appointed	
Rewarding Quality and Delivering Locally	Site-specific issues	Project delivery team to identify site-specific requirements	
	Long-term management	Proposals for a long-term management strategy	
	Community engagement	Community engagement strategy	
	Delivery and financial capacity	Development team, finance and market proposals are deliverable	

Fig.47

Quality Standards Checklist

Housing and Communities Agency, Places, Homes, People: Delivering Quality Places, 2007.

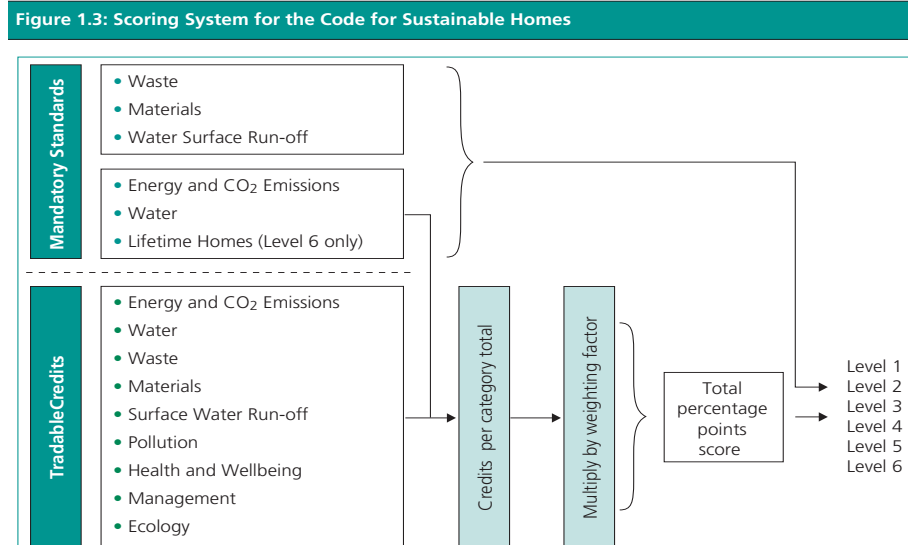


Fig.48
Scoring Code for the Code for Sustainable Homes
Department for Communities and Local Government, Code for Sustainable Homes, 2010.

With support from the central government, the *Code for Sustainable Homes* (2006) was introduced to improve the environmental sustainability of new developments (Fig. 48-49). The code awarded new homes a rating from Level 1 (entry level, above Building Regulation requirements) to Level 6 (the highest), based on their performance against nine sustainability criteria. Largely a voluntary standard, it was mandatory for affordable housing funded by the Homes and Community Agency or when adopted in local plans. The government hoped to achieve through the *Code for Sustainable Homes* that all new homes be zero carbon by 2016.¹⁶⁶ But it was withdrawn in 2015 and replaced by new but still optional building regulations regarding water efficiency and access in the home, unless where they were specifically made into a planning requirement or planning conditions for new residential developments.¹⁶⁷

The government also sponsored the establishment of the Zero Carbon Hub in 2008 to support the delivery of its zero carbon homes policy.¹⁶⁸ Promoting a range of low-carbon energy technologies and energy-efficient materials, new dwellings were to meet a minimum energy efficiency standard for heating and cooling, and overall emissions from regulated energy use (fans, pumps, lighting, and water heating) were to be reduced by a minimum of 70% through new energy efficiency standards and improved thermal performance of dwellings.¹⁶⁹

At the same time, CABE developed the Building for Life criteria, which were rewritten in 2012 and applied to all existing council and housing association

166..
Communities and Local Government, *Building a Greener Future: policy statement* (London: Communities and Local Government Publications, 2007), p. 5.

167.
'Housing Standards Review', BRE Group Services, BRE <<https://www.bre.co.uk/housing-standards-review>> [accessed 12 May 2020].

168.
It closed in 2016

169.
Nacer M'Sirdi, *Sustainability in Energy and Buildings: Proceedings of the 3rd International Conference on Sustainability in Energy and Buildings* (New York: Springer, 2012), p. 308.

Table 1.5: Summary of Environmental Impact Categories, Issues, Credits and Weighting		
Code Categories	Available Credits	Category Weighting Factor
Energy and CO₂ Emissions		
Dwelling emission rate	10	
Fabric energy efficiency	9	
Energy display devices	2	
Drying space	1	
Energy labelled white goods	2	
External lighting	2	
Low and zero carbon technologies	2	
Cycle storage	2	
Home office	1	
Category Total	31	36.40
Water		
Indoor water use	5	
External water use	1	
Category Total	6	9.00
Materials		
Environmental impact of materials	15	
Responsible sourcing of materials – basic building elements	6	
Responsible sourcing of materials – finishing elements	3	
Category Total	24	7.20
Surface Water Run-off		
Management of surface water run-off from developments	2	
Flood risk	2	
Category Total	4	2.20
Waste		
Storage of non-recyclable waste and recyclable household waste	4	
Construction site waste management	3	
Composting	1	
Category Total	8	6.40
Pollution		
Global warming potential (GWP) of insulants	1	
NOx emissions	3	
Category Total	4	2.80
Health & Well-being		
Daylighting	3	
Sound insulation	4	
Private space	1	continued
Lifetime Homes	4	
Category Total	12	14.00
Management		
Home user guide	3	
Considerate Constructors Scheme	2	
Construction site impacts	2	
Security	2	
Category Total	9	10.00
Ecology		
Ecological value of site	1	
Ecological enhancement	1	
Protection of ecological features	1	
Change in ecological value of site	4	
Building footprint	2	
Category Total	9	12.00
Total	107	100.00

Fig.49

Summary of Environmental Impact Categories, Issues, Credits and Weighting
Department for Communities and Local Government, Code for Sustainable Homes, 2010.

HQI Scores for this Project	Score	Weighting	Weighted Score
Location		10%	
Visual Impact		10%	
Open Space		10%	
Routes and Movement		10%	
Unit Size		10%	
Unit Layout		10%	
Unit Noise Control, Light Quality, Services		10%	
Accessibility within the unit	0%	10%	0.0%
Sustainability		10%	
Building for Life		10%	
Combined Score	Please complete all sheets		

Fig.50
HQI Project Summary
Homes and Community Agency, HQI Calculator (Excel), 2010

170.
NHBC, p. 10.

homes. It is a design tool for joint use by various housing stakeholders including home builders, local authorities, and communities in the delivery of 'well-designed homes and neighbourhoods'.¹⁷⁰ In addition, the *Design and Quality Standards* (D&QS) of 2007 by the Housing Corporation provided an updated version of the previous Scheme Development Standards (1993). Grants for social housing schemes depended on meeting the requirements set out by these standards. This included three core performance measures and standards: Housing Quality Indicators for internal environment standard (unit size, layout and services), sustainability rating (at least Level 3 of the *Code of Sustainable Homes*), and a Building for Life score (minimum 12 out of 20).

171.
Bowie, p. 218.

Shortly after, in 2008, the Housing Corporation and English Partnerships merged to become the Homes and Community Agency (HCA). Until 2018, the HCA was the national housing and regeneration agency, combining the housing delivery functions of the Department Communities and Local Government. HCA London merged with the GLA to become the HCA London Board, giving two years later full responsibility for London's housing strategy and investment to the London Mayor, equal to 40% of the national housing investment.¹⁷¹ Throughout 2011 to 2015, the HCA invested in affordable housing through the Affordable Homes Programme (AHP) and by meeting existing commitments from the 2008-2011 National Affordable Housing Programme (NAHP). Homes built under these funding schemes had to comply with the 2007 Housing Quality Indicators (HQI), the Building for Life standards, and the Design and Quality Standards. To assist in assessing affordable housing developments the HCA developed an HQI calculator based on one produced earlier by Levitt Bernstein (Fig. 50-51). Each indicator could contribute up to one-tenth to the final possible score. However, higher scores did not mean more funding. With a national housing standard being developed, the HQI and D&QS requirements were abolished in 2014.

Living space	1p	2p	3p	4p	5p	6p	7p	+
arm chair 850x850 – combination to equal one seat/person	2	2	3	1	2	3	4	+1
settee – 2 seat 850x1300 (optional; as above)								
settee – 3 seat 850x1850 (optional; as above)				1	1	1	1	
TV 450x600	1	1	1	1	1	1	1	1
coffee table 500x1050 or 750 diameter	1	1	1	1	1	1	1	1
occasional table (450x450)					1	1	1	1
storage units 500x1000 – and incrementally larger	1000	1000	1000	1500	2000	2000	2000	+
space for visitor chair 450x450	2	2	2	2	2	2	2	2
Dining space	1p	2p	3p	4p	5p	6p	7p	+
dining chair 450x450	2	2	3	4	5	6	7	8
dining table 800x800 – and incrementally larger	800	800	1000	1200	1350	1500	1650	+
sideboard 450x1000 (+ larger) (but not in dining/kitchen)	1000	1000	1000	1200	1500	1500	1500	+
Bedrooms	1p	2p	3p	4p	5p	6p	7p	+
Double bedroom	n/a							
Double bed 2000x1500 or 2 singles 2000x900		1	1	1	1	1	1	1
bedside table 400x400		2	2	2	2	2	2	2
chest of drawers 450 x750		1	1	1	1	1	1	1
table 500x1050 , and chair/stool		1	1	1	1	1	1	1
double wardrobe 600x1200 – could be built in		1	1	1	1	1	1	1
occasional cot space 600x1200 for family dwelling				1	1	1	1	1
Twin bedroom	n/a							
single bed 2000x900		2	2	2	2	2	2	2
bedside table 400x400		2	2	2	2	2	2	2
chest of drawers 450 x750		1	1	1	1	1	1	1
table 500 x 1050 , and chair/stool		1	1	1	1	1	1	1
double wardrobe 600x1200 (or two singles) could be built in		1	1	1	1	1	1	1
Single bedroom								
single bed 2000x900	1	1	1	1	1	1	1	1
bedside table 400x400	1	1	1	1	1	1	1	2+
chest of drawers 450 x750	1	1	1	1	1	1	1	2+
table 500 x 1050 and chair/stool	1	1	1	1	1	1	1	2+
single wardrobe 600x600 – could be built in	1	1	1	1	1	1	1	2+
Kitchen	1p	2p	3p	4p	5p	6p	7p	+
1 sink top and drainer 600x1000	1000	1000	1000	1000	1000	1000	1000	1000
2 cooker space 600x600	600	600	600	600	600	600	600	600

Fig.51
HQI Form
Homes and Community Agency, HQI Form, 2010

In 2010, the GLA produced the *London Housing Design Guide* (LHDG). It once again opened up a debate on if housing standards should apply to all housing sectors, whether public or private.¹⁷² Following public consultation, all homes built from 2011 onwards on London Development Agency (LDA) land and homes with funding from the London Homes and Community Agency (HCA) were expected to meet the ‘Priority 1’ standards set within the guide. ‘Priority 1’ defined a minimum gross internal floor area for 16 typical dwelling plans, and storage and open space provisions (Fig. 52). At the same time, the ‘Priority 2’ standards stipulating minimum floor areas and dimensions of habitable rooms were strongly recommended as good practice but not mandatory.

When the HCA London became a separate branch of the HCA in 2010, they incorporated the LHDG standards, including minimum floor areas, in the

172.
Design for London, *London Housing Design Guide: Interim Edition* (London: Mayor of London, 2010), p. 4.

Appendix 1 – Space Standards Study

This study of room sizes relative to designed occupancy levels is the basis of the minimum space standards (GIA) of Standard 4.1.1. To develop the space standards, each type of room was planned around the furniture listed in Appendix 2 and activity and access requirements. The GIA is the cumulative total of room areas plus an allowance for circulation and partitions.

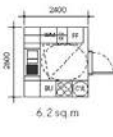
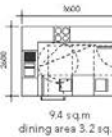


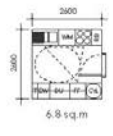
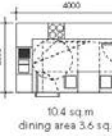

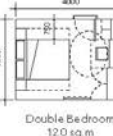
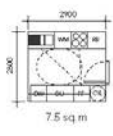

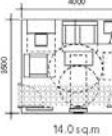
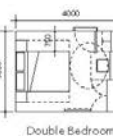

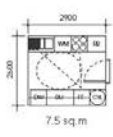
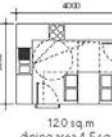
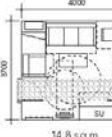


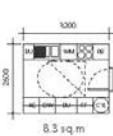

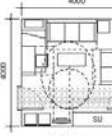
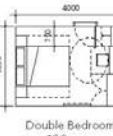


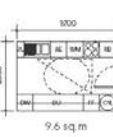
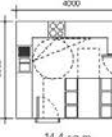

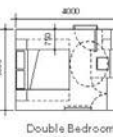



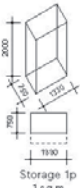
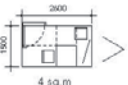
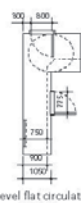
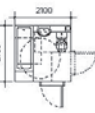

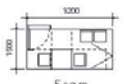
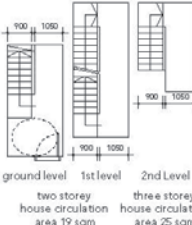

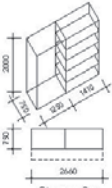

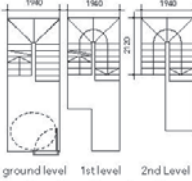

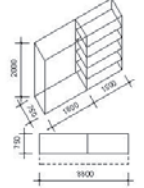
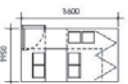
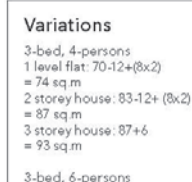
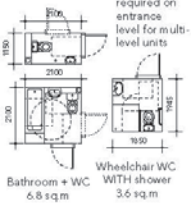
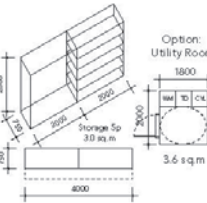

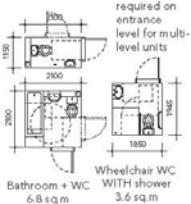
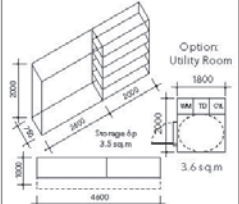
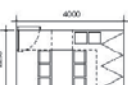
	Kitchen <i>*see key to kitchen items</i>	Dining <i>dining area calculated as difference of kitchen dining and kitchen</i>	Living	Combined Kitchen/ Living/Dining	Double	Twin	Single
1-person	 6.2 sq.m	 9.4 sq.m dining area 3.2 sq.m	 12.0 sq.m	21 sq.m			 Bedspace 8.0 sq.m
1-bed, 2-persons	 6.8 sq.m	 10.4 sq.m dining area 3.6 sq.m	 13.0 sq.m	23 sq.m	 Double Bedroom 12.0 sq.m		
2-bed, 3-persons	 7.5 sq.m	 11.2 sq.m dining area 3.6 sq.m	 14.0 sq.m	25 sq.m	 Double Bedroom 12.0 sq.m		 Single Bedroom 8.0 sq.m
2-bed, 4-persons	 7.5 sq.m	 12.0 sq.m dining area 4.5 sq.m	 14.8 sq.m	27 sq.m	 Double Bedroom 12.0 sq.m	 Twin Bedroom 12.0 sq.m	
3-bed, 5-persons	 8.3 sq.m	 12.8 sq.m dining area 4.5 sq.m	 16.0 sq.m	29 sq.m	 Double Bedroom 12.0 sq.m	 Twin Bedroom 12.0 sq.m	 Single Bedroom 8.0 sq.m
4-bed, 6-persons	 9.6 sq.m	 14.4 sq.m dining area 4.8 sq.m	 17.0 sq.m	31 sq.m	 Double Bedroom 12.0 sq.m	 Twin Bedroom 12.0 sq.m	 2 Single Bedroom 16.0 sq.m

Fig.52
Space Standards Study
Mayor of London, London Housing Design Guide, 2010

Bathroom	Storage/Utility	Outdoor Amenity Space	Net Internal	Circulation:	Partition walls allow 5 %	GIA (exc. amenity)	Circulation Layouts Stairs for 3m floor to floor height 15 steps 230/200
 Shower Room 3.6 sq.m.	 Storage 1p 1 sq.m.	 4 sq.m.	33.5 sq.m.	1 Level Flat + 1.5 sq.m.	2 sq.m.	37 sq.m.	 one level flat circulation area 6.5-12.5 sq.m.
 Bathroom 4.4 sq.m.	 Storage 2p 1.5 sq.m.	 5 sq.m.	41 sq.m.	1 Level Flat + 6.5 sq.m.	2.5 sq.m.	50 sq.m.	 ground level 1st level 2nd Level two storey house circulation area 19 sq.m.
 Bathroom 4.4 sq.m.	 Storage 3p 2.0 sq.m.	 6 sq.m.	51.5 sq.m. 54.5 sq.m.	1 Level Flat + 6.5 sq.m. 2 Storey House + 19 sq.m.	3 sq.m. 3.5 sq.m.	61 sq.m. 77 sq.m.	 ground level 1st level 2nd Level three storey house circulation area 25 sq.m.
 Bathroom 4.4 sq.m.	 Storage 4p 2.5 sq.m.	 7 sq.m.	58 sq.m. 60 sq.m.	1 Level Flat + 8.5 sq.m. 2 Storey House + 19 sq.m.	3.5 sq.m. 4 sq.m.	70 sq.m. 83 sq.m.	 Alternative stair configuration
 Bathroom + WC 6.8 sq.m.	 Storage 5p 3.0 sq.m.	 8 sq.m.	71 sq.m. 72 sq.m. 72 sq.m.	1 Level Flat + 10.5 sq.m. 2 Storey House + 19 sq.m. 2 Storey House + 25 sq.m.	4.5 sq.m. 5.0 sq.m. 5.0 sq.m.	86 sq.m. 96 sq.m. 102 sq.m.	Variations 3-bed, 4-persons 1 level flat: 70-12+(8x2) = 74 sq.m. 2 storey house: 83-12+ (8x2) = 87 sq.m. 3 storey house: 87+6 = 93 sq.m. 3-bed, 6-persons 1 level flat: 99-16+12 = 95 sq.m. 2 storey house: 107-16+12 = 103 sq.m. 3 storey house: 113-16+12 = 109 sq.m. 4-bed, 5-persons 1 level flat: 86-12+(8x2) = 90 sq.m. 2 storey house: 96-12+ (8x2) = 100 sq.m. 3 storey house: 102-12+ (8x2) = 106 sq.m.
 Bathroom + WC 6.8 sq.m.	 Storage 6p 3.6 sq.m.	 9 sq.m.	81.5 sq.m. 82.5 sq.m. 82.5 sq.m.	1 Level Flat + 12.5 sq.m. 2 Storey House + 19 sq.m. 2 Storey House + 25 sq.m.	5.0 sq.m. 5.5 sq.m. 5.5 sq.m.	99 sq.m. 107 sq.m. 113 sq.m.	*Key to Kitchen Items AE Ancillary Equipment BU Base Unit CYL Hot Water Cylinder DR Drawers DW Dishwasher-optional FF Fridge/Freezer RB Recycle Bins SU Storage Unit T Tray Space WM Washing Machine

new London Plan of 2011. This was heavily opposed by developers because compliance would become a funding condition. Before adopting the LHDG standards, the GLA commissioned new studies on space standards. First *a Room to Swing a Cat? The Amount and Use of Space in New Dwellings in London & the South East* (2010) a report by the HATC, based on a review of 17 different housebuilders and 89 dwellings, concluded that homes were on average smaller than the recommended standards, thus giving evidence in support of reintroducing space standard (Fig. 53-54).¹⁷³ The GLA also published the *Housing Supplementary Planning Guidance* (SPG 2012), in which the standards were renamed as 'baseline' and 'good practice'. This meant that although minimum floor areas became baseline requirements, other secondary standards such as minimum room areas were not enforced in private housing.¹⁷⁴ The SPG provided area tables for 77 dwelling types, effectively combining three sets of previous space standards, the NHF Indicative Minimum Dwelling Areas (2008), HCA consultation (2010), and GLA standards (2010).¹⁷⁵

Unifying previous standards, the Nationally Described Space Standard (NDSS) of 2015 by the Ministry of Housing, Communities and Local Government (formerly the Department for Communities and Local Government) offers detailed guidance on the minimum sizes of new homes suitable across all tenures. The room dimensions it provided were derived from the previous Housing Quality Indicators and the *London Housing Design Guide* (2010), requiring minimum internal gross floor areas and single bedrooms of at least 7.5 m² (minimum 2.15 m width) and double bedrooms of minimum 11.5 m² (first double to have minimum 2.75 m width and others at least 2.55 m). The NDSS established the space standard for a one-person one-bedroom dwelling as 39 m² (or 37 m² if only a shower room is provided). Based on the LHDG of 2010, the NDSS is the same for single-storey dwellings but smaller for two- and three-storey dwellings (Fig.).

As stated on the UK Government's website, the NDSS 'will replace the existing different space standards used by local authorities. It is not a building regulation and remains solely within the planning system as a new form of technical planning standard.'¹⁷⁶ The NDSS brings into question the role of local planning authorities in regulating and enforcing space standards. The UK government page emphasizes: 'Where a local planning authority (or qualifying body) wishes to require an internal space standard, they should only do so by reference in their Local Plan to the Nationally Described Space Standard.'¹⁷⁷ The NDSS is suitable for new homes built to Category 1 and Category 2 of Part M (Accessibility) of the Building Regulations. Extended in 1999 from public buildings to private dwellings, the Approved Document Part M of the Building Regulations requires that all new housing meet minimal 'visitability' criteria (Fig. 55).¹⁷⁸

Among some of the changes from the 2011 to the 2016 version of the London Plan is the adoption of the NDSS minimum space standards for new dwellings. However, the London Plan (2016) requires the floor-to-ceiling

173.
Park, p. 8.

174.
Ibid, 41.

175.
Ibid.

176.
'Statutory Guidance: Technical Housing Standards - Nationally Described Space Standard', Planning and Building, GOV.UK: Housing, Local and Community <<https://www.gov.uk/government/publications/technical-housing-standards-nationally-described-space-standard>> [accessed 24 May 2020].

177.
'Guidance: Housing - optional technical standards', Planning and Building, GOV.UK: Housing, Local and Community <<https://www.gov.uk/guidance/housing-optional-technical-standards>> [accessed 23 May 2020].

178.
Part M legislates for three tiers of accessibility: the baseline Category 1 or 'visitable dwellings, Category 2 'adaptable and accessible housing', and Category 3 'wheelchair user housing'.



Fig.53
Analysis of Notional Corridors and Habitable Areas
HATC, Room to Swing a Cat?, 2010

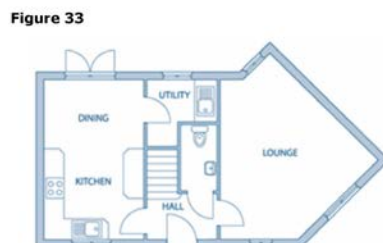


Fig.54
Samples of Dwellings with Inconvenient Layouts for Conventional Furniture
HATC, Room to Swing a Cat?, 2010

Number of bedrooms	Number of bed spaces	Minimum GIA (m ²)			Built-in storage (m ²)
		1 storey dwellings	2-storey dwellings	3-storey dwellings	
1b	1p	39 (37)*			1.0
	2p	50	58		1.5
2b	3p	61	70		2.0
	4p	70	79 *83		
3b	4p	74	84 *87	90	2.5
	5p	86	93 *96	99 *102	
	6p	95	102	108	
4b	5p	90	97 *100	103 *106	3.0
	6p	99	106 *107	112 *113	
	7p	108	115	121	
	8p	117	124	130	
5b	6p	103	110	116	3.5
	7p	112	119	125	
	8p	121	128	134	
6b	7p	116	123	129	4.0

*red indicates different minimum GIA from 2010 LHDG

Gray indicates minimum GIA remained same as 2010 LHDG

1. Built-in storage areas are included within the overall GIAs and include an allowance of 0.5m² for fixed services or equipment such as a hot water cylinder, boiler or heat exchanger.
2. GIAs for one storey dwellings include enough space for one bathroom and one additional WC (or shower room) in dwellings with 5 or more bedspaces. GIAs for two and three storey dwellings include enough space for one bathroom and one additional WC (or shower room). Additional sanitary facilities may be included without increasing the GIA provided that all aspects of the space standard have been met.
3. Where a 1b1p has a shower room instead of a bathroom, the floor area may be reduced from 39m² to 37m², as shown bracketed.
4. Furnished layouts are not required to demonstrate compliance.

Table 7

Provision of Space and Rooms According to Dwelling Type and Number of Bedrooms
Ministry of Housing, Communities and Local Government, Nationally Described Space Standards, 2015

Circulation areas and internal doorways

Door and hall widths

- 1.15 To facilitate access into **habitable rooms** and to a WC in the **entrance storey**, door and hall widths should comply with all of the following (see Diagram 1.2).
- Every door to a **habitable room** and the room containing the WC has a minimum **clear opening width** as set out in Table 1.1, when measured in accordance with Diagram 1.1.
 - Any **localised obstruction**, such as a radiator, does not occur opposite or close to a doorway, and is no longer than 2m in length; and the corridor is not reduced below a minimum 750mm width at any point.

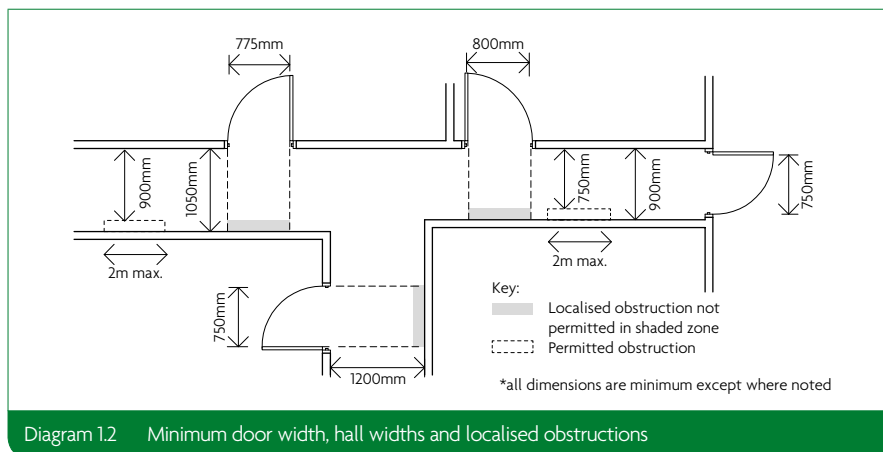


Fig.55
Approved Document M: Access To and Use of Buildings,
Ministry of Housing, Communities and Local Government, The Building Regulations , 2010

height to be a minimum of 2.5 m for at least 75% of the gross internal area, while the NDSS only requires 2.3 m. The London Plan (2016) also provides an updated version of the 2012 *Housing Supplementary Planning Guidance*. Dwellings funded under the GLA's Homes for Londoners: Affordable Homes Programme 2016–21 are expected to meet the housing design and sustainability standards set out in the London Plan and SPG of 2016.¹⁷⁹

In the current draft of the London Plan of 2019, it states that ‘it is crucial that those involved in planning and development in London understand how London’s three-tier planning system works (including regional, local and neighbourhood planning)’.¹⁸⁰ It contains the same space standards as the NDSS (and the previous 2016 edition of the London Plan) that apply to all housing tenures to achieve Policy D4 Housing Quality and Standards.¹⁸¹ When submitting a planning application for dwellings, there are two levels of mandatory documents: national and local. Local planning authorities, in addition to national requirements, can list further requirements that an application must meet.

179.
The HCA was replaced in January 2018 by Homes England and the Regulator of Social Housing sponsored by the Ministry of Housing, Communities & Local Government, an executive non-departmental public body that regulates private registered providers of social housing. Among the funding programmes taken over from the HCA are the Shared Ownership and Affordable Homes Programme 2016/2021.

180.
London Plan Team, *The Draft London Plan - consolidated changes version* (London: London Plan Team, 2019), p. 5.

181.
Housing developments must also ensure that at least 10% of dwellings meet Building Regulation requirement M4(3) ‘wheelchair user dwellings’ and the rest M4(2) of the requirements on ‘accessible and adaptable dwellings’.

Conclusions: Policy and Regulations

The examination of housing acts, reports, manuals, design guidelines, policies, and regulations reveal their collective impact on housing provision in London and key moments in the formation of the housing market. It highlights significant historical changes in how 'universal' housing ideals were implemented. This has come with a shift in focus of housing policy from general public health concerns to specific design problems linked to space standards and home use in relation to daily routines and the lifecycle of a family household to, more recently, less tangible design drivers such as sustainability or social value and wellbeing. These shifts were underpinned by health, social, and technical research whose evidence base has informed changing spatial reasoning and housing design.

In the Georgian period, surveyors would gather and share information regarding property size and building material, not only for safety but also for tax purposes. The Victorian period, concerned with health and hygiene, based many of its regulations on mortality rates, poverty statistics, and overcrowding surveys. However, surveys and statistics would largely reveal the symptoms but did not address underlying issues of the quality of homes. Around the 1930s, different housing stakeholders realised the value of understanding how people lived. Through committees, public polls, questionnaires, exhibitions, and disseminating information, participatory methods were widely used from the post-war reconstruction up to the Parker Morris Report. Although public opinion and participatory methods led to important new insights and design decisions, it would also promote certain

lifestyles over others, such as that of the traditional family. More recently, the process of consultation has become an integral part of decision making, incorporating a wider community of stakeholders, experts, and residents, but also raises questions about who participates and is represented.

Despite far-reaching financialisation of housing, the value of homes is still largely argued in social terms. Yet, the qualitative aspects of space have been increasingly measured through quantitative means. Even more recent debates such as those on the social value of housing are quantified and calculated in economic terms. Adopting a functional approach and quantitative assessment of housing qualities is not always a reliable indicator, especially when it comes to understanding user needs. For example, while the number of occupants is critical to space standard calculations and design, actual property occupancy rates often differ significantly. Space standards also reinforce assumptions that stem from twentieth-century social norms such as the nuclear family model. While families with dependent children still account for half of all families in London, a growing proportion of people now live alone (28%), an increase of 13% since the 1960s.

The interplay between socio-cultural transformations or ambitions and measurable assessments has been formative to the various housing design standards. Historically, housing standards have been part of responsive and preventive housing policies that reacted to unpredictable challenges, for example, the housing shortage following World War I and II or demographic changes like the rapid growth of an urban population and poor sanitation in the Victorian era and, more recently, to issues arising with climate change and an ageing population.

In England, housing reports have been important milestones for new housing acts and design guidelines starting with the *Tudor Walters Report* (1918). It deemed the construction of post-war housing for the working-class a national responsibility, providing a series of standard plans that could be easily replicated but, based on Victorian ethos and morality, also proliferated housing typologies that specifically attended to the needs and values of the nuclear family. *The Dudley Report* (1944) was a significant step to regulating qualitative housing standards through 'efficient' and standardised layouts, with housing standards in England peaking with the *Housing Manual* (1949) and housing supply led by the government.¹⁸² The UK's best-known space standard, deriving from the *Parker Morris Report* (1961), saw an important shift to non-standard and evidence-based, 'scientific' measures. While the report returned to the provision of numerical values and recommendations of minimum standards within particular dwelling typologies, it paid

182.
GLA and HATC, p. 21.

particular attention to notions of usability and flexibility. This was further echoed by the design manuals it inspired, *Generic Plans* (1965) and *Design Bulletin 6* (1968). These design guidelines completed the move from qualitative ideas underpinning standard plans to a quantitative definition of housing standards, despite its quantitative assessments being rooted in a qualitative judgement, as the users and their daily routines defining the space standards were normative and gendered.

The abolishment of the Parker Morris standards in 1980 marked a significant reduction in government intervention. Space standards soon dropped by 5 to 15% and the marketisation of housing resulted in ‘public housing’, accessible widely to the population, making way for ‘social housing’ that provides accommodation to only those not served by the market.¹⁸³ Given the large-scale and long-term failure of the market to meet the full spectrum of housing needs today, it raises the question of how contemporary forms of public housing could look like.

183.
Karn and Sheridan, p. 15.

Since the 1980s and the wholesale privatisation of housing, it has often been ‘good practice’ guidance or research produced by non-governmental housing stakeholders that have led to new design standards – some of which have been adopted as legal requirements such as the Building Regulations. As noted by Julia Park, thereby often a trade-off between higher legal status and lower design requirements takes place. With privatisation and deregulation, there has also been a shift from the use of prescriptive ‘standard plans’ to more ‘space standards’ as a policy instrument to give greater design flexibility.

The last 20 years have been characterised by rising housing cost and a drop in housing standards. While the functional requirements of building regulations are fixed, space standards are not, and tend to vary between different tenures. In 1982 Ellen Leopold and Donald Bishop compared space standards and design quality in public and private dwellings, demonstrating that public housing had higher standards. Their survey shows that on average, the public sector houses were a third larger than those in the private sector. The public sector was about 1% above and the private sector 33% below Parker Morris standards, in which ‘in many cases rooms simply cannot accommodate the basic furniture necessary for its stated function.’¹⁸⁴

184.
Ellen Leopold and Donald Bishop, *Design philosophy and practice in speculative house building*. (London: Building Economics Research Unit, 1981), p. 71.

Space standards are now significantly lower than those in continental Europe, the current *Nationally Described Space Standards* (2015) sets out detailed guidance on the minimum size of new homes. Despite being close for the first time to creating a national space standard for all housing tenures, this has opened up questions about the legal status of housing design standards. In

185.

Andrew Drury, 'Parker Morris – Holy Grail or Wholly Misguided?', *Town & Country Planning Association Journal*, 77.10 (2008), p. 403.

addition, while the current UK prime minister Boris Johnson has suggested that we return to the use of Parker Morris standards, this misunderstands how space standards are in many ways contextual to a time and the conditions of the housing sectors.¹⁸⁵ As Park observed, while overall dwelling sizes have returned to that recommended in the *Tudor Walters Report* (Tudor Walters = 79.4 m² for a 'non-parlour house' compared to the NDSS 79 m² for a two-bedroom four-person unit), the internal distribution has significantly changed.

There are not only significant shortcomings of space standards in some housing sectors but also in building regulations. There has been a widespread systemic failure in how regulations meant to safeguard the health and safety of buildings and its occupants have been insufficiently enforced due to far-reaching deregulation and financialisation of the housing market. The Grenfell Tower fire in 2017 is only a particularly tragic example of how regulatory frameworks have failed. Growing evidence shows that housing in the UK is poorly built and planned. The whole housing procurement process and supply line require rethinking and innovation and more effective regulation.

Housing policy and standards have not led to convenient rules of thumb or convincing long-term housing design solutions. In fact, housing standards have been regularly abandoned in times of high housing demands and crisis to enable faster and greater supply. They have become defined in opposition to investment and development by the market. In addition, minimum standards have generally become targeted as maxima by developers. At the same time, although the comparable size of homes designed for a specific number of occupants is higher in Europe, England's space per person is greater, indicating cultural aspects to housing and the housing market. The English housing market privileges the number of bedrooms or separate living spaces over the total floor area, which leads to a tendency to under-occupy or overcrowd homes. It also means that properties are not immediately comparable to space standards. Furthermore, what is experienced as a small or poor-quality home is subjective and depends on individual use and experience of a home, shaped by the personal circumstances and histories of an occupant.

There is a lack of more data-driven and evidence-based approaches to the analysis and evaluation of housing outcomes that take into consideration the multi-scalar problems of housing, including issues of procurement and financing, but also understands better what housing quality indicators mean to occupants. Likewise, while research into the relationship between

household, home use, and housing design was essential to housing studies from the post-war period to at least the 1980s, there is a significant knowledge gap how today's demographics and use patterns compare or if changing housing needs and household compositions are sufficiently served by current housing models.

A key question raised by this housing study so far is if housing standards are an effective means to safeguard minimum performance requirements. It also points to the problem of how a minimum requirement is defined and might change over time. How then should minimum space standards be determined and reasoned, and how can they be more inclusive of a wider demographic and housing needs?

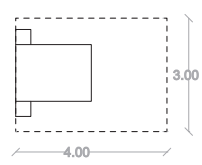
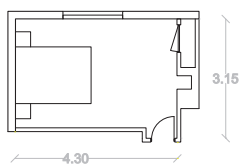
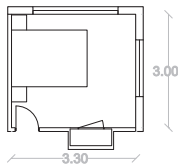
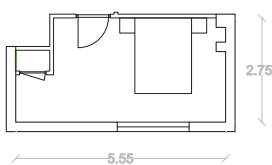
Comparing Bedroom Space Standards

The following graph and plans show changes in housing policy and regulation in the UK and their effects on the size and design of bedrooms within the home. Unlike other rooms within the home that have undergone more radical transformations over the past century, bedroom furniture and design have changed little. Thus, fluctuations in the provision of space within the bedroom can be more easily observed and compared across various periods.

Based on standards provided by respective manuals on the first (main) bedroom within a 3-bedroom property (unless otherwise stated), this information highlights a downward trend in the size and provision of bedroom spaces.

Note :

- 1)All plans are presented at a scale of 1:200
- 2)All black room dimensions make reference to widths and lengths advised by certain manuals.



1919 Housing Manual

14.5 m2

This prescribed bedroom layout was provided as shown by the 1919 *Manual on the preparation of state-aided housing schemes* informed by the 1918 *Tudor Walters Report*.

1944 Housing Manual

14 m2

Based on the *Dudley Report's* recommendations, the 1944 *Housing Manual* provides type plans and emphasizes the provision of 3 bedroom houses.

1949 Housing Manual

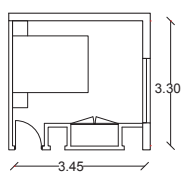
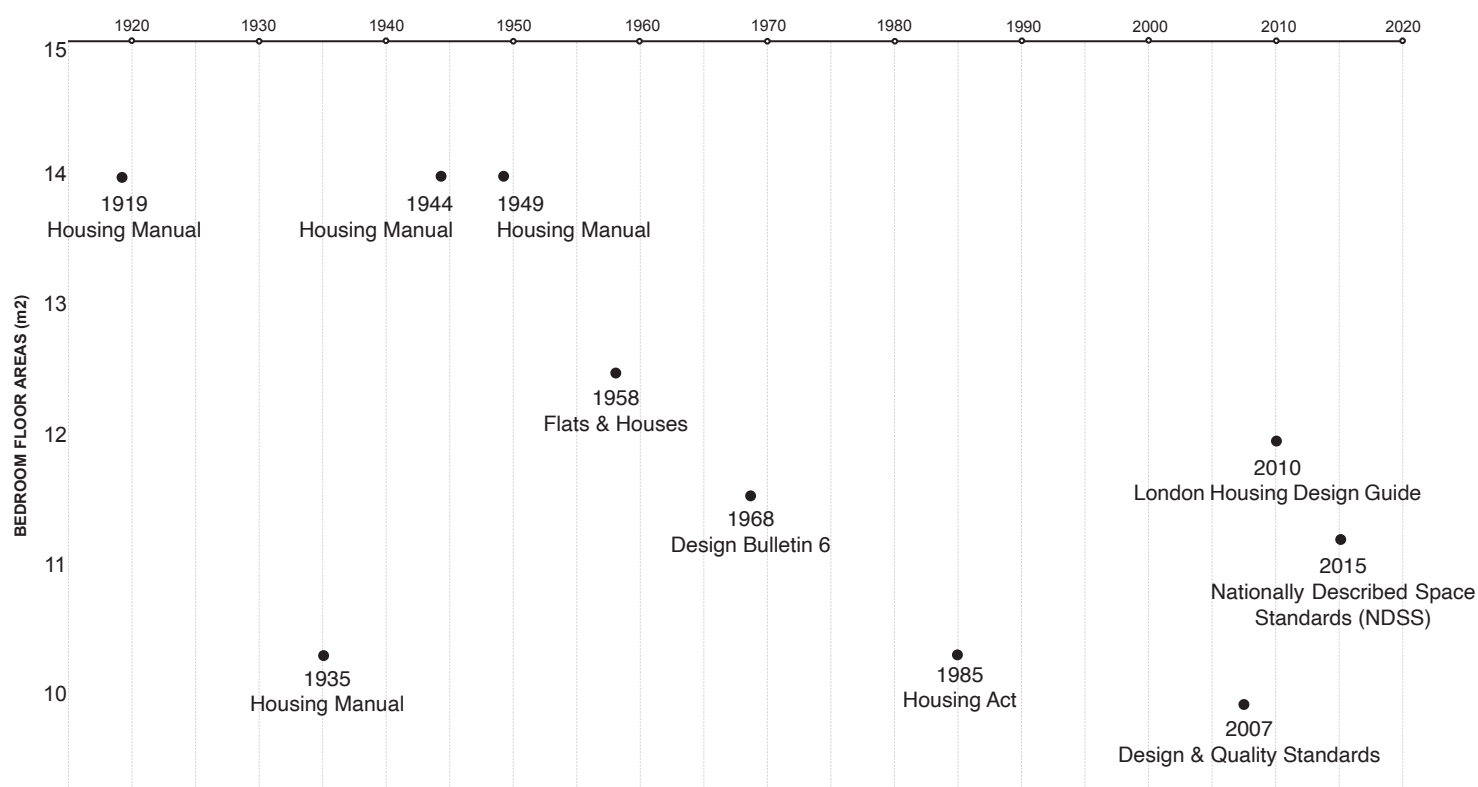
14 m2

Alongside providing guidance on the total internal floor area of various property typologies, this manual detailed preferred arrangements of bedrooms and other rooms within the home.

1958 Flats & Houses

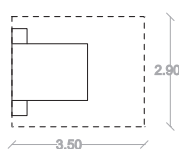
12.5 m2

This manual provided numerical values for the production of standardised bedroom spaces. These internal areas were fixed regardless of dwelling typology.



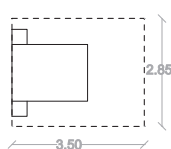
1968 Design Bulletin 6
11.5 m²

Informed by the 1961 *Parker Morris Report*, it emphasised activity based design with few prescribed plans.



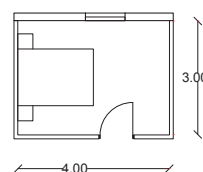
1985 Housing Act
10.2 m²

This act based its numerical values for bedroom floor areas on types of inhabitants. With adults and children accounting for 1 and 0.5 inhabitants respectively.



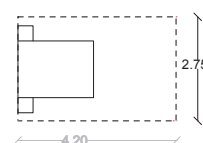
2007 Design & Quality Standards
10.0 m²

While this study provides no standardised bedroom areas or designs, it notes that 10m² should be added for every additional bedroom.



2010 London Design Guide
12.0 m²

This report provides a table of room sizes relative to designed occupancy levels as the basis of minimum space standards. Each type of room was planned around furniture, activity and access requirements.



2015 NDSS
11.5 m²

This manual does not provide prescribed designs or bedroom layouts, but states that a double room should be at least 2.75m in width.

Chapter 2:

Housing Typologies

Plans

All plans within this chapter are presented at scale 1:200, unless otherwise stated, and all diagrams are presented at 1:500.

They are labelled accordingly:

- B (Bedroom)
- b (Bathroom)
- D (Dining Room)
- K (Kitchen)
- L (Living Room)
- P (Parlour)
- S (Scullery)

Introduction

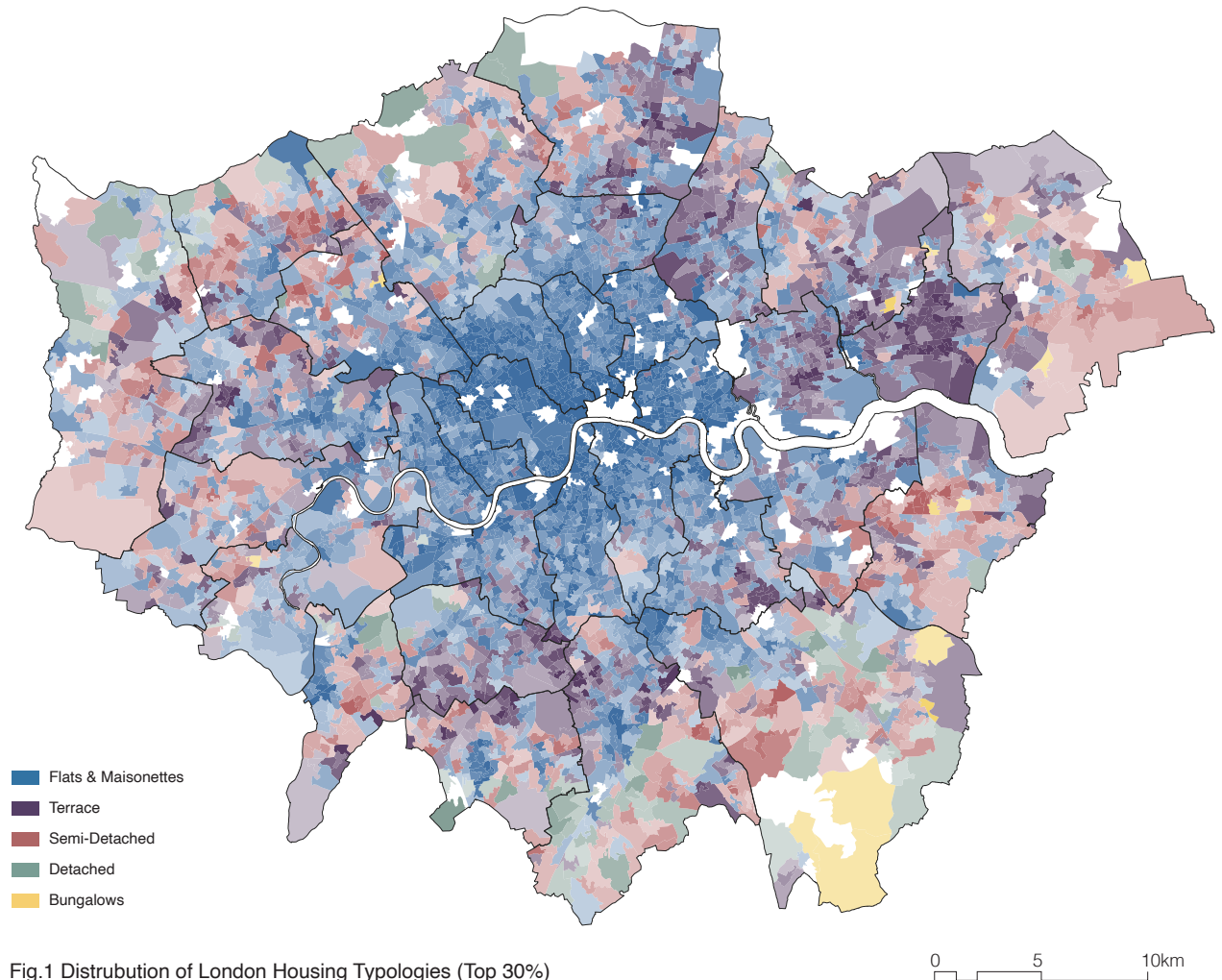


Fig.1 Distribution of London Housing Typologies (Top 30%)

The presence or absence of certain housing typologies in an area can be a telling indicator of social and economic conditions. Similarly, the size, layout, and style of a dwelling can indicate different lifestyles and class. Given London's diverse demographic and a multitude of lifestyles, it is unsurprising that its housing stock is markedly different from that of the rest of the UK. Despite 66% of all homes in England taking the form of terraced, detached or semi-detached houses, over 54% of London's housing is made up of flats, whereas they only account for 22% of housing across the rest of the country.¹ Once considered minor dwelling typologies, comprising only 7% of London's housing stock in 1964, today flats constitute London's main housing typology.² This dominance is highest in the centre, where flats represent a staggering 74.7%. In contrast, in the outer suburbs, the ratio between

1. Valuation Office Agency, 'Number of Properties by Council Tax Band, Property Type and Region, County and Local Authority District', 2018.

2. Alison Ravetz, *The Place of Home: English Domestic Environments 1914-2000* (London: Taylor & Francis, 2013), p. 41.

3. Valuation Office Agency, 'Dwellings by Property Build Period and Type'.

flats (39.5%) and terraced houses (30.5%) is more balanced. Further out in London's periphery, a third typology emerges, the semi-detached house, accounting for 20.7% of housing stock as opposed to only 2.6% in the city's inner boundaries.³ (Fig.1)

4. Ravetz, *Place*, p. 41.

The terraced house has a deep-rooted tradition in London, beginning in the seventeenth-century and spanning across the Georgian and Victorian periods. The city's remarkable expansion between World War I and II gave rise to semi-detached and detached suburban housing developments for growing working-class and middle-class families. In the mid-nineteenth century, the flat was an exception, first occurring in three- to five-storey buildings as part of urban slum clearance projects.⁴ From the 1930s onward, however, its use became prolific in high-density developments with tower and slab blocks that have come to characterise post-war housing in England.

5. Ministry of Housing, Communities, and Local Government, *English Housing Survey: Floor Space in English Homes – Main Report*, (London: Ministry of Housing, Communities and Local Government, 2018), p. 7.

According to the Ministry of Housing, Communities, and Local Government, 43% of all new homes constructed after 2002 within the city were purpose-built flats, predominantly with two bedrooms.⁵ The internal floor areas of these flats were smaller than those in traditional family-sized semi-detached homes built between 1945 and 1975.⁶ While we have witnessed a fluctuation in space standards, this has been compensated, to some extent, by modern appliances and fittings and the grouping of some activities and functions. Evidence of this is a shift from having both a scullery and kitchen to a kitchenette, then to only a working kitchen, and more recently to an open plan kitchen. Another important change affecting the interior design of homes is that from considerations of social status to functionality and usability, giving less importance to a layout based on formal and informal than public and private distinctions. While the *Tudor Walters Report* (1918) still accounted for many of these representational social functions, the *Dudley Report* (1944) and subsequently the *Parker Morris Report* (1961) proposed space standards derived from observations of more intimate family dynamics and daily activities.

6. Ibid, p. 1.

The evolution of rooms in the home and their design during the twentieth-century have reflected on changes in domestic life and household compositions. Innovation in the design of homes has thereby occurred very differently in single-storey dwellings such as flats than in two-storey dwellings like terraced houses. Historically, dwelling typologies such as cottage flats, model dwellings, and maisonettes often adopted the layout of two-storey houses, as this is what the target demographic groups were used to and aspired to. Therefore, innovation in relation to changing domestic use primarily took place in houses before being adapted in flats. However, while access types in two-storey dwellings have remained largely static, single-storey ones have seen constant changes in how units are accessed, grouped, and organised. The increase of the flat typology in London has also been the result of many conversions of terraced housing. This terraced-house-flat hybrid also demonstrates the blurred boundaries between building and dwelling typologies, and functional changes over time.

The Typological Classification of Housing

The UK's main 'property types' are bungalows, terraced houses, flats and maisonettes, semi-detached houses, and detached houses. These can also be considered as 'dwelling typologies' and have a direct relationship to 'building typologies': one group is made up of houses such as bungalows, detached houses, semi-detached houses, and terraced houses, and another group by buildings associated with flats and maisonettes such as blocks of flats, slab blocks, and tower blocks. Each has a distinctive plan arrangement and organisation, but their standard classification is often derived from historical and social categories that make assumptions on what a building and dwelling typology is or should be. The relationship between building and dwelling typologies however can change over time, for example, when terraced houses are converted into flats – thus changing from being coextensive to becoming separated.

The problem of how to classify housing through building and dwelling typologies is related to the question of its value to their analysis and the design or planning of housing. Considering how different dwelling classifications inform space standards and building regulations, the following observations can be made. While space standards use both typological and morphological categories, building regulations relate mostly to morphological criteria. Both focus on dimensional and quantitative forms of assessment, which require morphological analysis and evaluation. A direct relationship between space standards, building regulations, and architectural form and design exist through this. In particular, building regulations are formative to how space in the home is defined by design requirements that ensure a safe and secure built environment. Some building regulations apply specifically to some dwellings typologies, such as two-storey dwellings with staircases, while other aspects such as accessibility apply to all dwelling and building typologies.

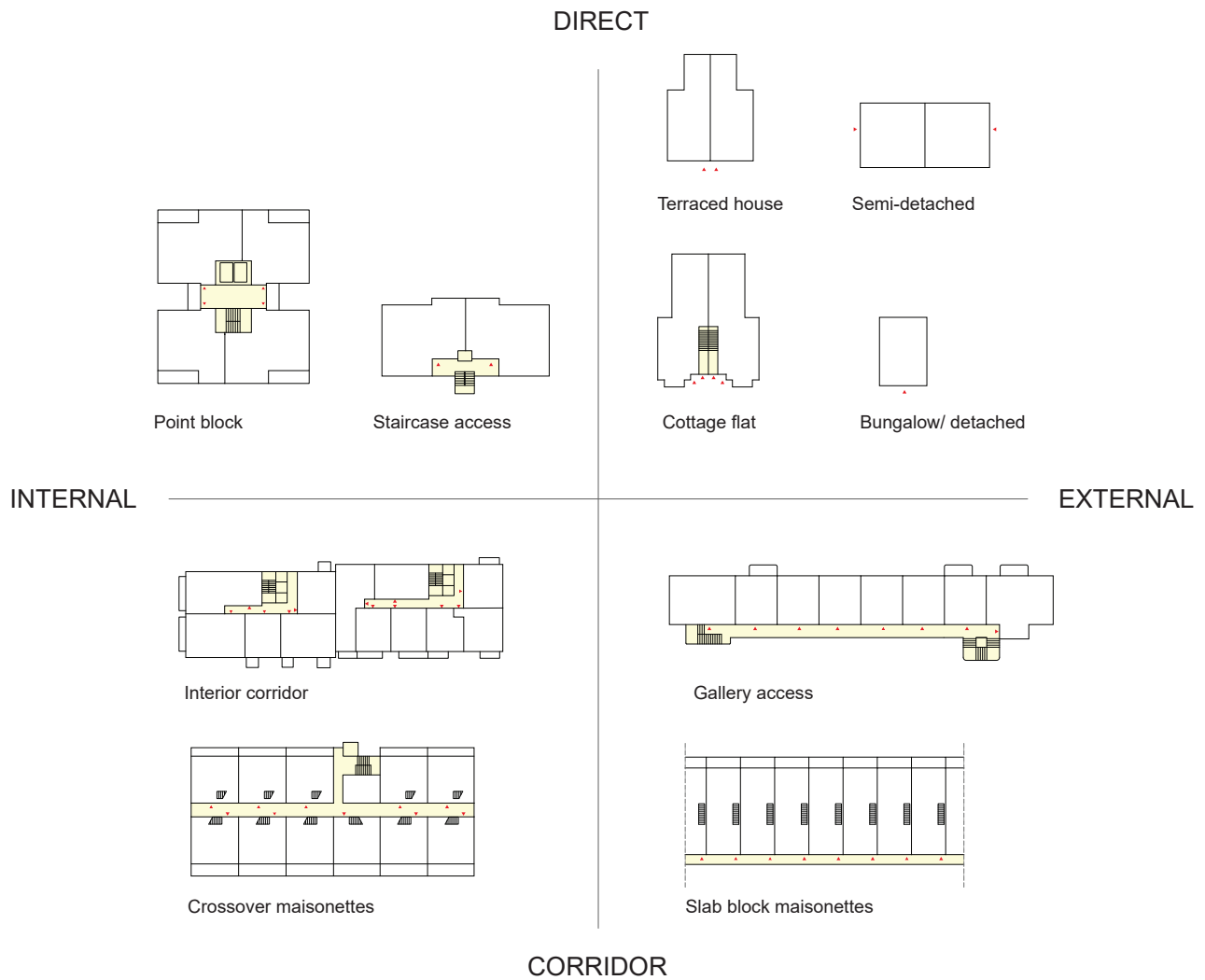
There is growing interest in the relationship between housing design, building regulations, and how we live. For example, Tatjana Schneider and Jeremy Till argue in *Flexible Housing* (2007) that regulating floor space can create 'determinate spaces' restricting functions and behaviour, proposing that fully flexible housing should allow for different spatial arrangements that can adapt to changing living patterns over time.⁷ They also claim that 'soft spaces', such as circulation areas, lose their flexibility when designed to minimum space standards. Barry Goodchild and Robert Furbey similarly point out that the Parker Morris space standards by assuming a specific relationship between space and activities, limited changes in furniture layouts and the long-term usability of homes.⁸ In addition, for David Levitt, the greatest innovations in flat layouts for more than half a century occurred when various uses were combined and overlapped in open-plan layouts.⁹

7. Tatjana Schneider and Jeremy Till, *Flexible Housing* (Oxford: Architectural Press, 2007), 7.

8. Barry Goodchild and Robert Furbey, "Standards in Housing Design: A review of the main changes since the Parker Morris report (1961)," *Land Development Studies* 3, no.2 (1986): 83.

9. David Levitt and Jo McCafferty, *The Housing Design Handbook: A Guide to Good Practice* (London: Routledge, 2019), 71.

Circulation and Access Types



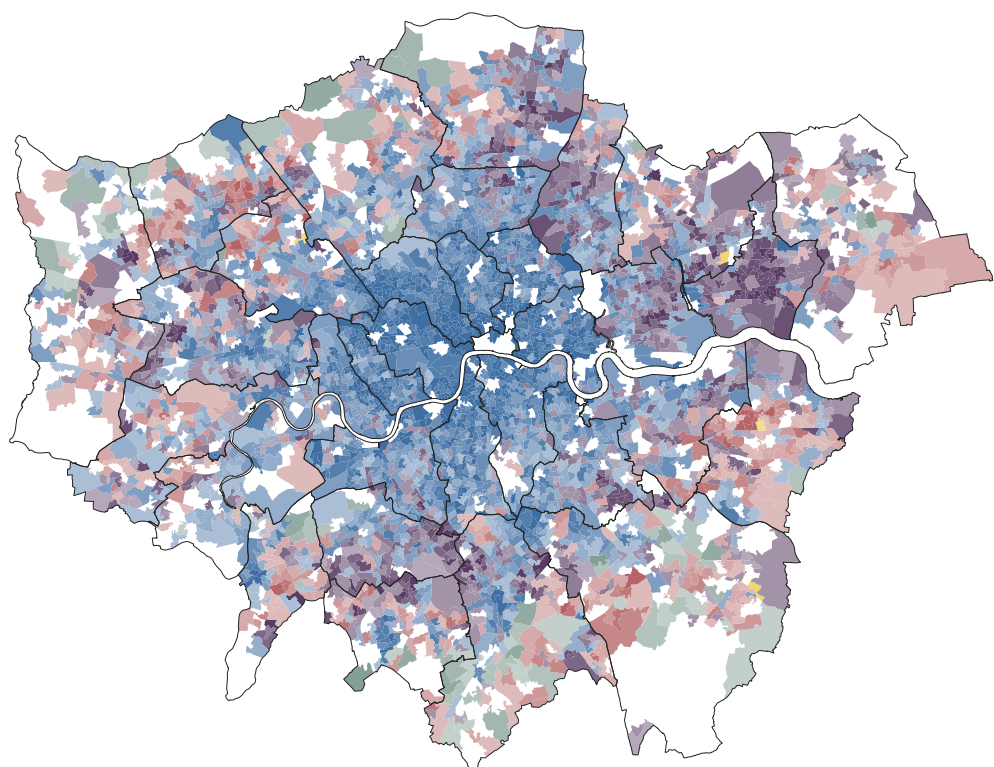
This chapter will analyse some of the histories that underpin these discussions essential to understanding the changing design and expectations of housing. It is specifically concerned with a typological analysis of housing and its design, with dwelling typologies classified according to their morphological and spatial organisation, that is: the number of storeys, access types, and internal organisation and circulation. Through this formal and organisational analysis, the relationship between different plan configurations and elements that shaped them and their design are discussed. Considering the similarity of internal spatial and programmatic distribution in single- or two-storey dwellings, for example, houses and maisonettes, the number of storeys of a dwelling is used as a primary criterion, but to further differentiate these, different dwelling access types are used.

Access to dwellings is generally arranged according to the following types. 'Direct from exterior' is common to bungalows, houses, and cottage flats, with a unit accessed from the street or equivalent via separate or paired external entrance doors. 'Direct from interior' is found in tenements, tower blocks, and blocks of flats in which units are accessed from shared vertical stair/lift cores that typically serves up to four units per floor and with entrance doors arranged in pairs or as clusters.¹⁰ 'Exterior gallery access' refers to double-aspect units in slab blocks that are entered via an open external deck or access balcony – a shared horizontal circulation connected to vertical circulation cores. Single aspect flats are commonly associated with enclosed 'internal access corridors', which can be either single- or double-loaded. The variation of these access types depends on unit design and size, construction costs, restrictions imposed by the site's physical limits, and resident demographics. However, access types at the scale of the building also inform design and layout decisions at the scale of the individual unit. For example, for blocks of flats to achieve desirable unit orientations that maximise natural daylighting and privacy, access types have a direct impact on the design of single and dual aspect units including the internal positioning of the kitchen, bathroom, and habitable rooms.

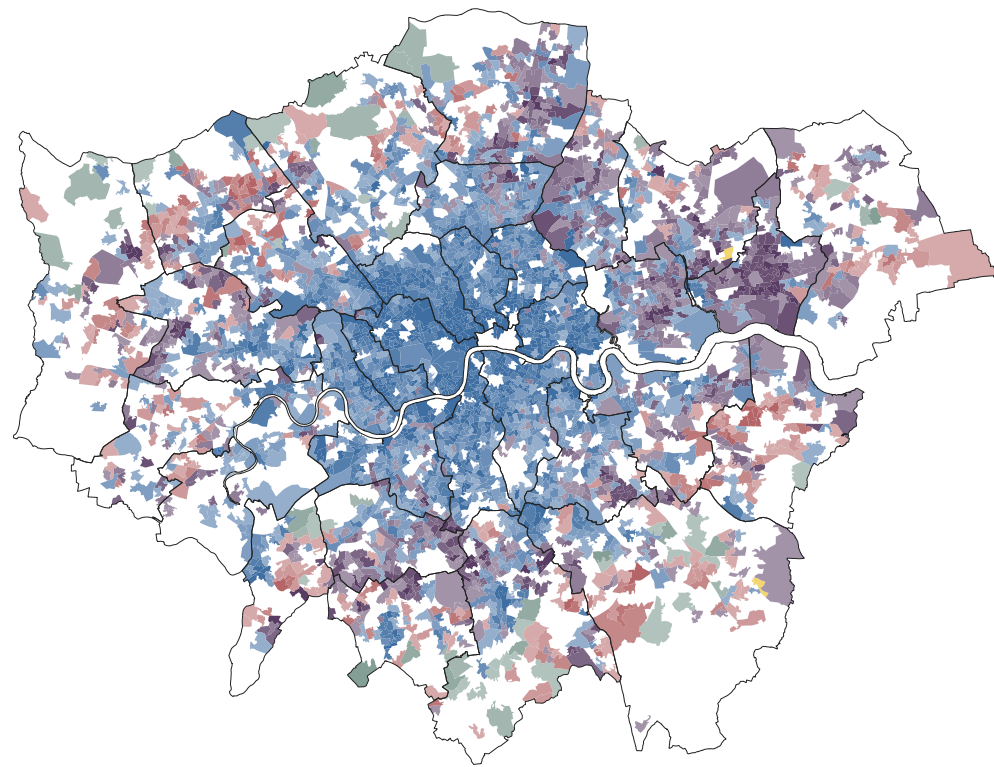
10.
Direct in pairs is also commonly known as 'twin access' or 'stair access'.

Chapter 2 relates the discussions around space standards and building regulations in Chapter 1 to the development of building and dwelling typologies in London. While a chronological narrative in Chapter 1 allows situating housing standards and policy within their respective social, economic, and historical context, Chapter 2 analyses dwelling typologies through their unit composition, morphology, and spatial characteristics. This chapter is organised into an analysis and comparison of three, two- and single-storey dwelling and building typologies.

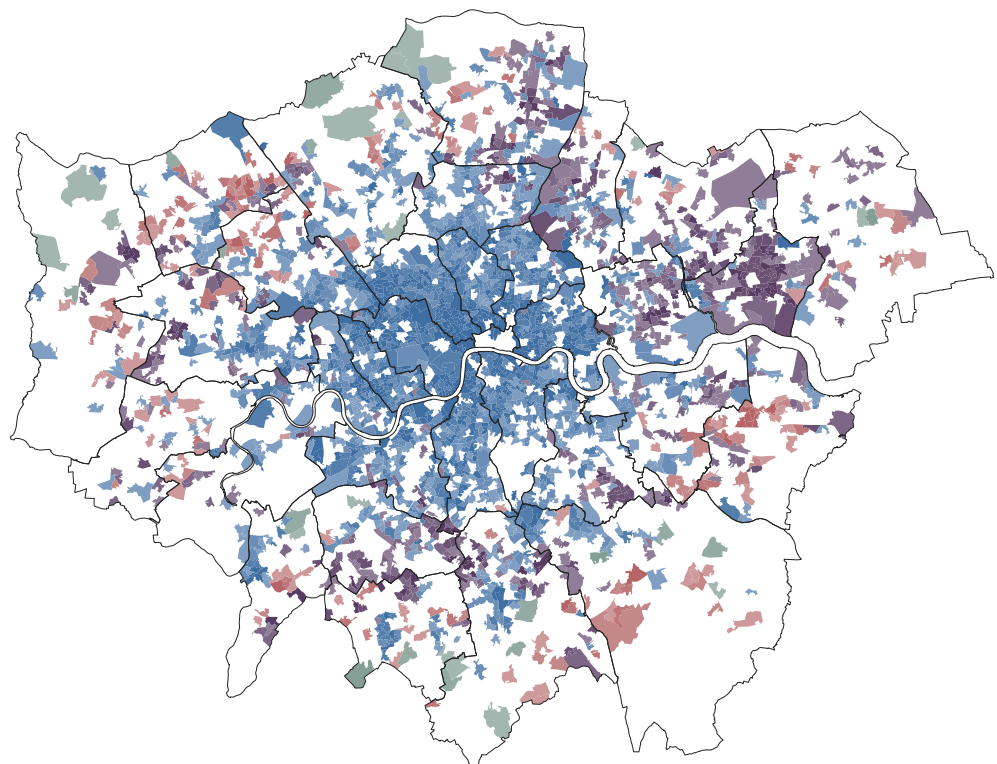
Distrubution of London Housing Typologies by Percentage



Top 40%



Top 50%



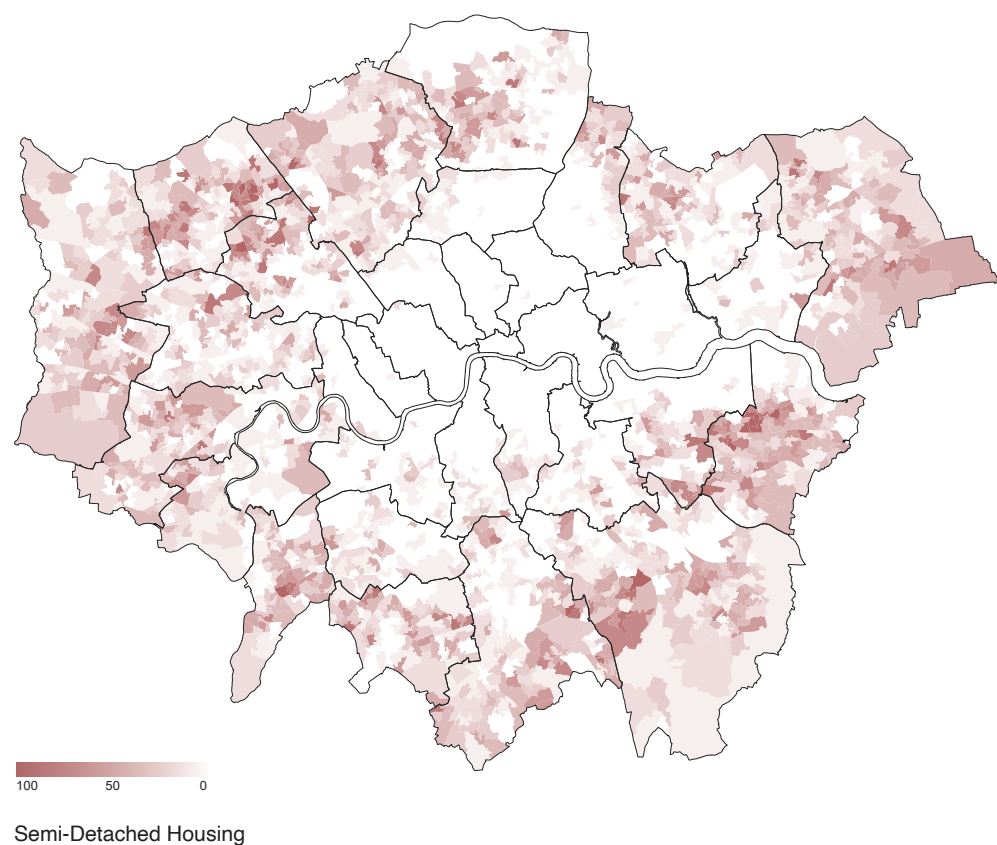
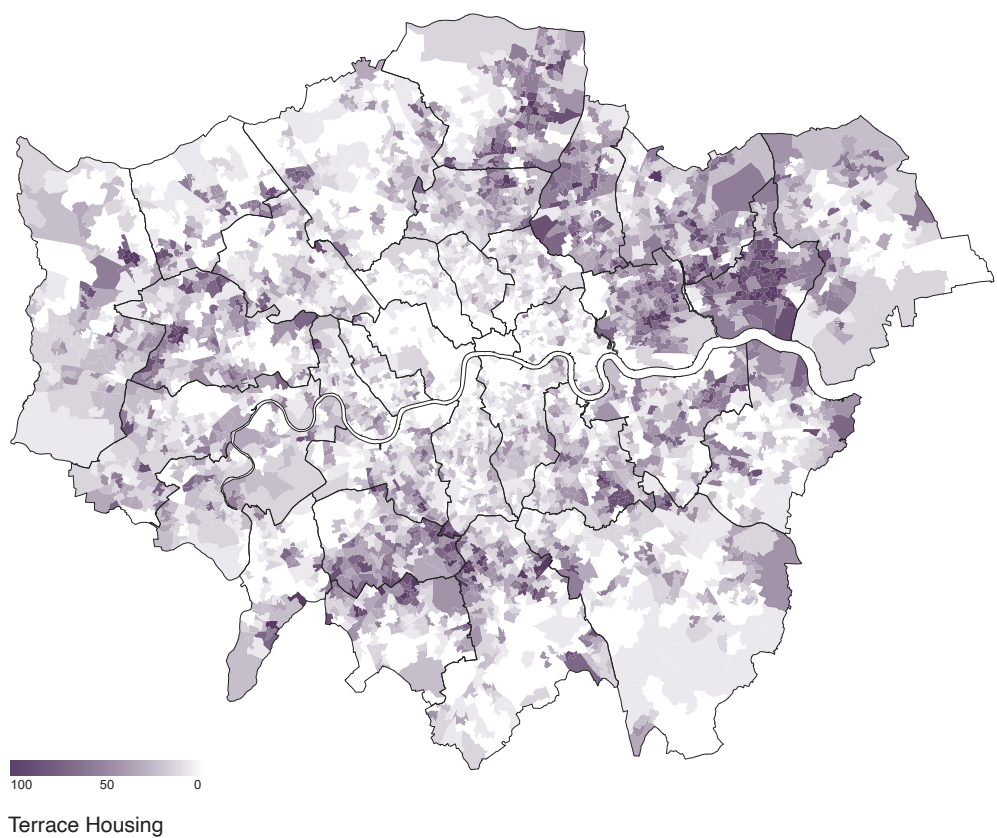
Top 60%

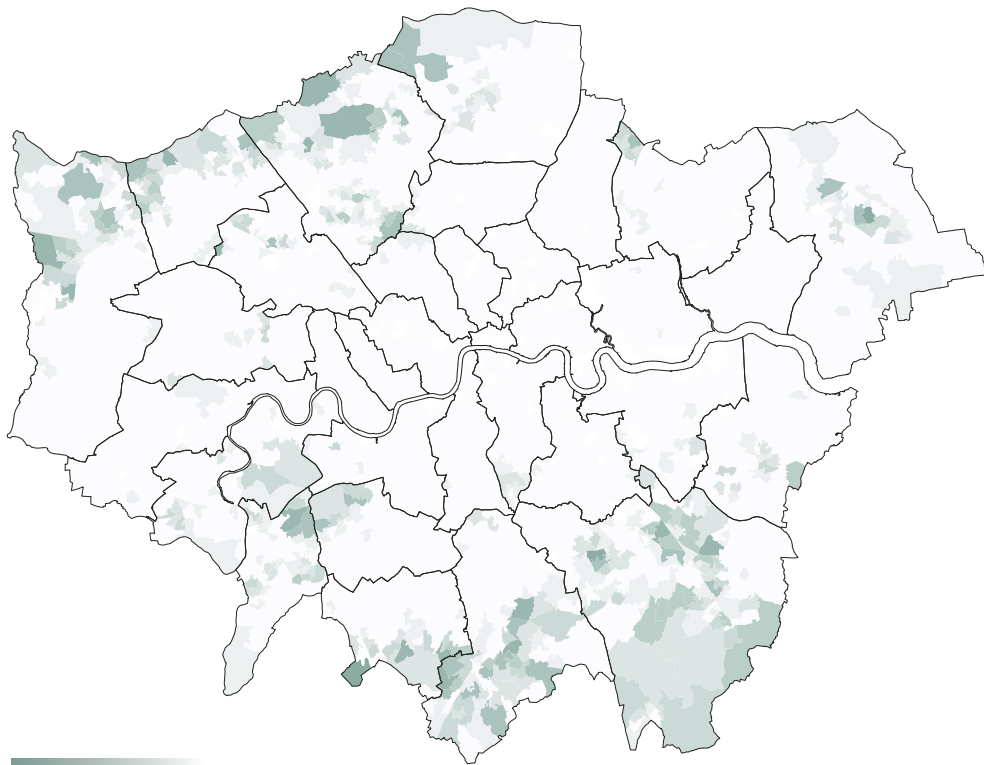
- Flats & Maisonettes
- Terrace
- Semi-Detached
- Detached
- Bungalows

Maps

These maps give an overview of London's current housing stock at the resolution of the geospatial statistical unit defined by the Lower Layer Super Output Area (LSOA). The information is shown according to the distribution of property types. This is based on domestic property data for England and Wales published by the Valuation Office Agency (31 March 2015) and includes the property type categories of the bungalow, flat/maisonette, terraced house, semi-detached house, and detached house.

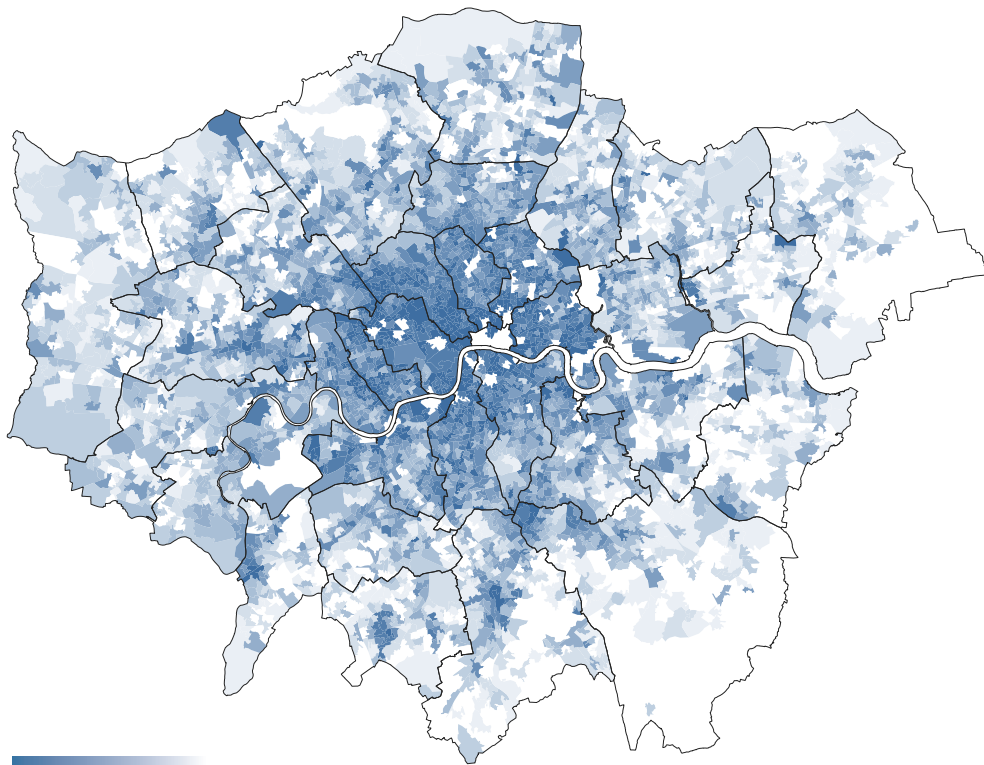
Distrubution of London Housing by Dwelling Type





100 50 0

Detached Housing



100 50 0

Flats & Maisonnettes

0 5 10km

Dwellings by Number of Bedrooms



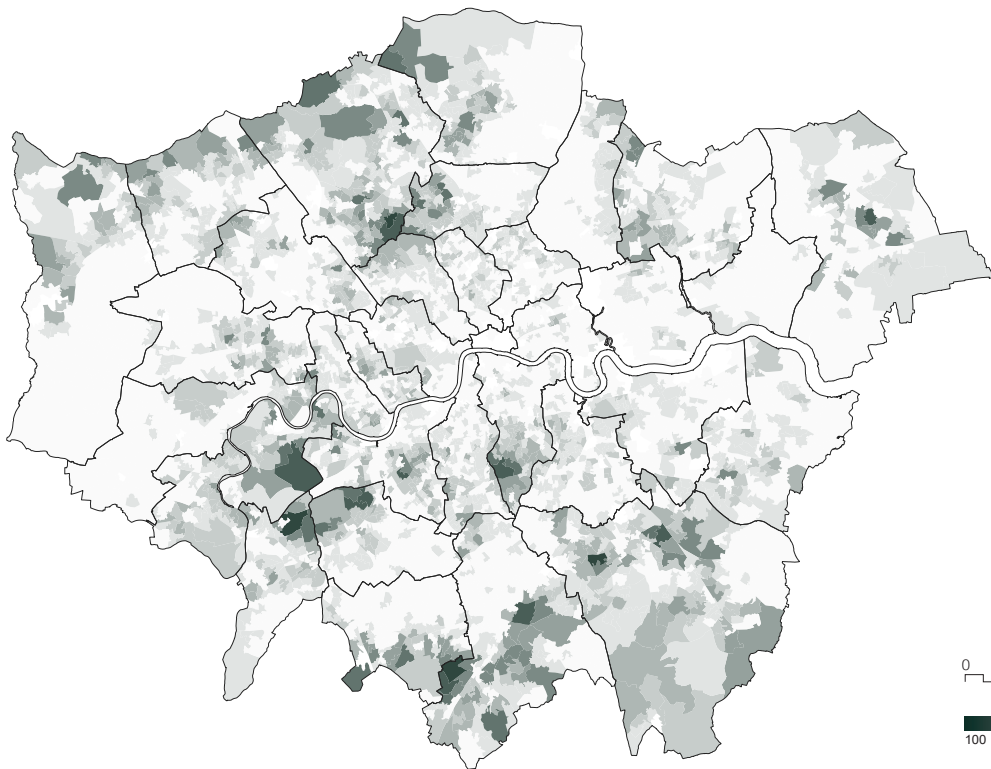
One Bedroom



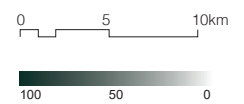
Two Bedroom



Three Bedroom



Four Bedroom



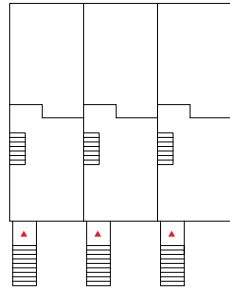
Three-Storey+ Dwellings

A three-storey or taller dwelling is typically a detached, semi-detached, or terraced house with direct access from the street. In contrast, access to less common three-storey flats is arranged similar to two-storey maisonettes and single-storey flats. Three- or more storey dwellings, specifically terraced houses, were prolific in the Georgian period and would have many bedrooms for large families with servants. During the post-war reconstruction, the triplex or three-storey flat appeared alongside the two-storey maisonette. Today, some contemporary schemes have returned to the use of three-storey houses, as they offer developers larger dwellings on smaller plots of land or meet higher densities.¹¹

11.
Robert Imrie, *Accessible Housing: Quality, Disability and Design* (London: Routledge, 2006), p. 131.

Terraced houses

Three-Storey+ Dwellings



Terraced House, Gore Road, 1966

Terraced houses or row houses share party walls and a common building line, with front facades typically having a uniform appearance. In medieval England, the term ‘row’ or ‘rangia’ was applied to houses with a common appearance, predominantly a group of adjoining dwellings or shops.¹² Terraced houses are said to have arrived in Britain in 1630 with Inigo Jones’s Covent Garden Piazza, inspired by European models such as Place des Vosges in Paris built by Henry IV (1605–1612) with uniform facades surrounding a square. The term ‘terraced house’ dates from the eighteenth-century and may originate from the Adelphi, a row of palatial houses designed by the Adam brothers in 1768–72 on a terrace raised above a bank of the River Thames (Fig. 2).¹³ By the early Victorian period, a terraced house designated any style of housing that saw joined rows of houses repeat the same design.

The first terraced houses in London were composed of three or more storeys, and only a few of the first London squares in the seventeenth and early eighteenth-century had uniform facades. They were five-storey pilastered houses with a public arcade on the ground floor and dwellings located on the upper floors. The four-storey Newington Green row houses (1658) are considered precursors to Georgian terraced houses, representing one of the few examples to survive the Great Fire of London in 1666 (Fig. 3). After the fire, the Rebuilding of the City of London Act of 1667 required buildings to be constructed of brick or stone. Shared brick party walls achieved substantial cost savings for builders, making the terraced house quickly the preferred and predominant housing typology (Fig. 4). A standardised housing plan and economic building process were the main reasons for the rise and permanence of terraced housing (Fig. 5).¹⁴

12. Roger H Leech, ‘The Prospect from Rugman’s Row: The Row House in Late Sixteenth and Early Seventeenth-Century London’, *Archaeological Journal*, 153.1 (2017), p. 202.

13. They were demolished in 1936. See, Marcus Binney, *Town Houses: Urban Houses from 1200 to the Present Day* (New York: Whitney Library of Design, 1998), p. 54.

14. Stefan Muthesius, *The English Terraced House* (New Haven: Yale University Press, 1982), p. 4.

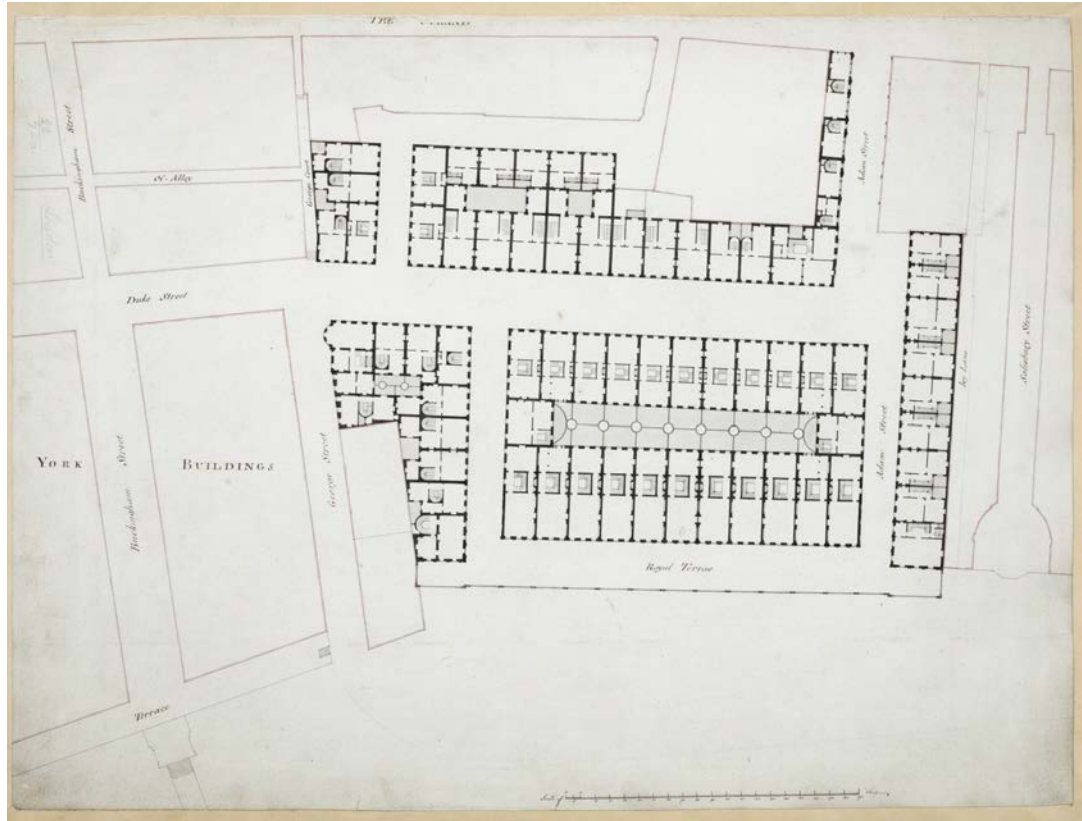


Fig.2
Masterplan and Drawing of Exterior
Row of Palatial Houses, Adelphi, 1768-72
Adam Brothers



Fig.3
Photograph of Exterior
Terraced Houses, Newington Green, 1658

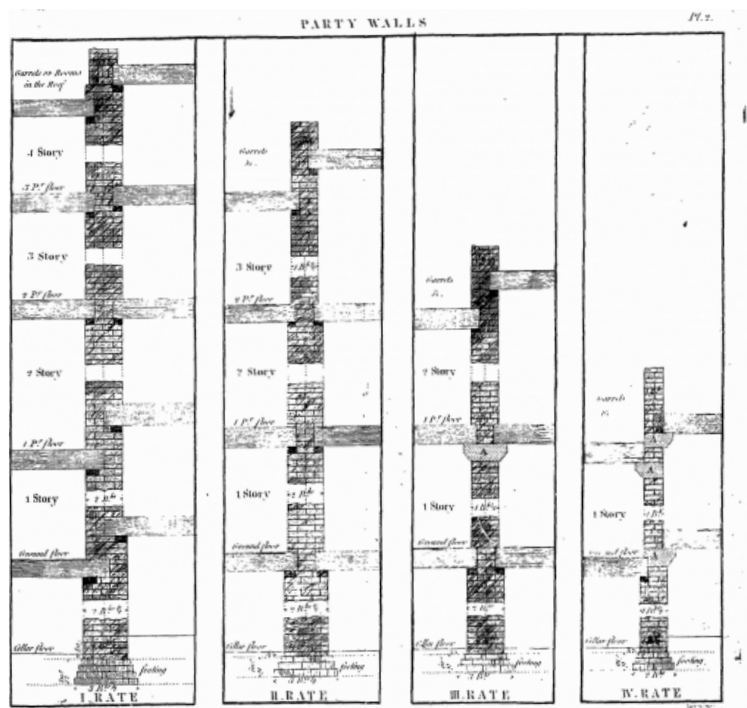


Fig.4
Sectional Illustrations of "Party Walls"
John Matthews, *An Abstract of the Act of Parliament*, 1774

[Draft: Update with high-res image]

PLANS OF FLOORS TO A FIRST RATE HOUSE.

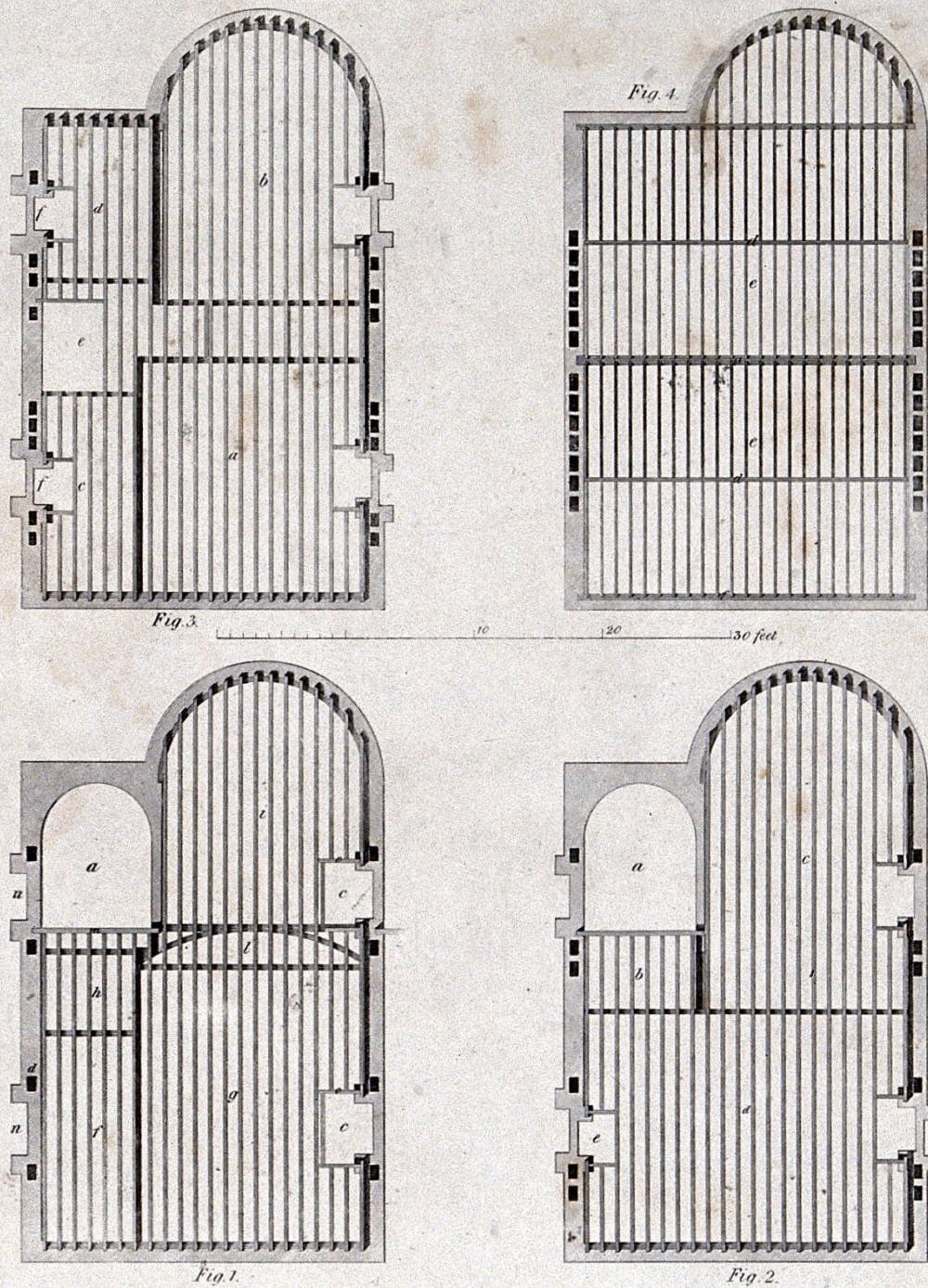


Fig.5
Floor Plans of First Rate House showing the Layout of Flooring Joists
Peter Nicholson, *The Builder's and Workman's New Director*, 1834

15.
Roy Porter, *London: A Social History* (London: Hamish Hamilton, 1994), p. 103.

The first London site to be called a square was Bloomsbury Square, laid out in the 1660s by the 4th Earl of Southampton.¹⁵ Bloomsbury Square initiated a new town-house style that would characterise London's housing developments of this period: a square surrounded on three sides by narrow-fronted terraced houses. The houses had a rectangular plan and were four storeys tall but also had a basement. The square formed a residential unit, with each estate planned as a self-contained community with a secondary grid of smaller streets, shops, and services.

16.
Hermann Muthesius, *The English House* (London: Crosby Lockwood Staples, 1979), p. 86.

Terraced housing in the Georgian period (1714–1837) was characterised by narrow but tall proportions. The Building Act of 1774 defined four types of rates of houses according to size and height. The lowest (fourth rate) was typically two or three storeys high, with the first to third class ranging between four to five storeys. While widths were less varied, building depth could substantially differ. But depth would normally not exceed four times the width of the house, as this would limit the amount of natural daylight in the interior.¹⁶

17.
Binney, p. 61.

Large terraced houses often had so-called 'mews' built in the private backyards of a terrace, providing service access and smaller buildings for carriages, stables, and living quarters for servants. Mews have largely disappeared today.¹⁷ There was a strong social divide between the front of the house for the family and the back of the house for servants as well as the upstairs and downstairs (basement). This was reinforced in large terraced houses by having separate entrances and service stairs for servants at the back. One of the first examples of terraced houses with mews is Grosvenor Estate in Mayfair, built in the 1720s by the Grosvenor family (Fig. 6). Substantial terraced houses would conventionally also have both a parlour (formal reception room indicating social status) and sitting room (family living room), while in smaller ones – common in Victorian times of social transition – owners opted to have either one or the other. But in large terraced houses, the most important room was often the drawing room (living room for family and guests) located on the first floor and extending across the full width of the building's frontage.¹⁸ The bedrooms were placed on the first floor and above, and as the levels rose, the building decoration was simplified, the ceiling height lowered, and windows made smaller. The attic provided sleeping quarters for servants and the basement, emerging in the early eighteenth-century, was used for storing coal and frequently housed a bath and sink and on occasion a kitchen (Figs. 7-9).

18.
The name 'drawing room' derived from 'withdrawing room' where women withdrew after dinner.

Post-war mixed-housing developments such as Alton West (1959) by the LCC Architects Department led by Colin Lucas also included three-storey

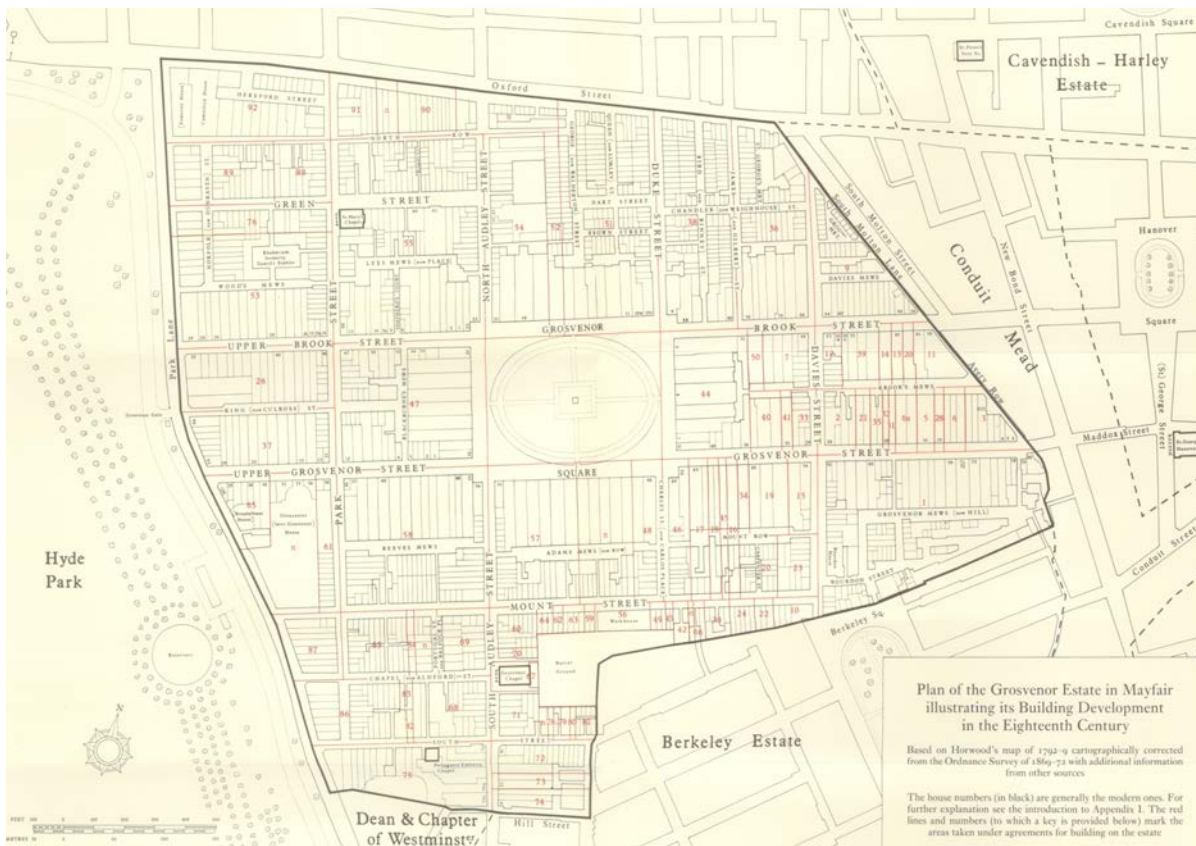


Fig.6
Master Plan of Terraced Houses with Mews
Grosvenor Estate, Mayfair, c.1720

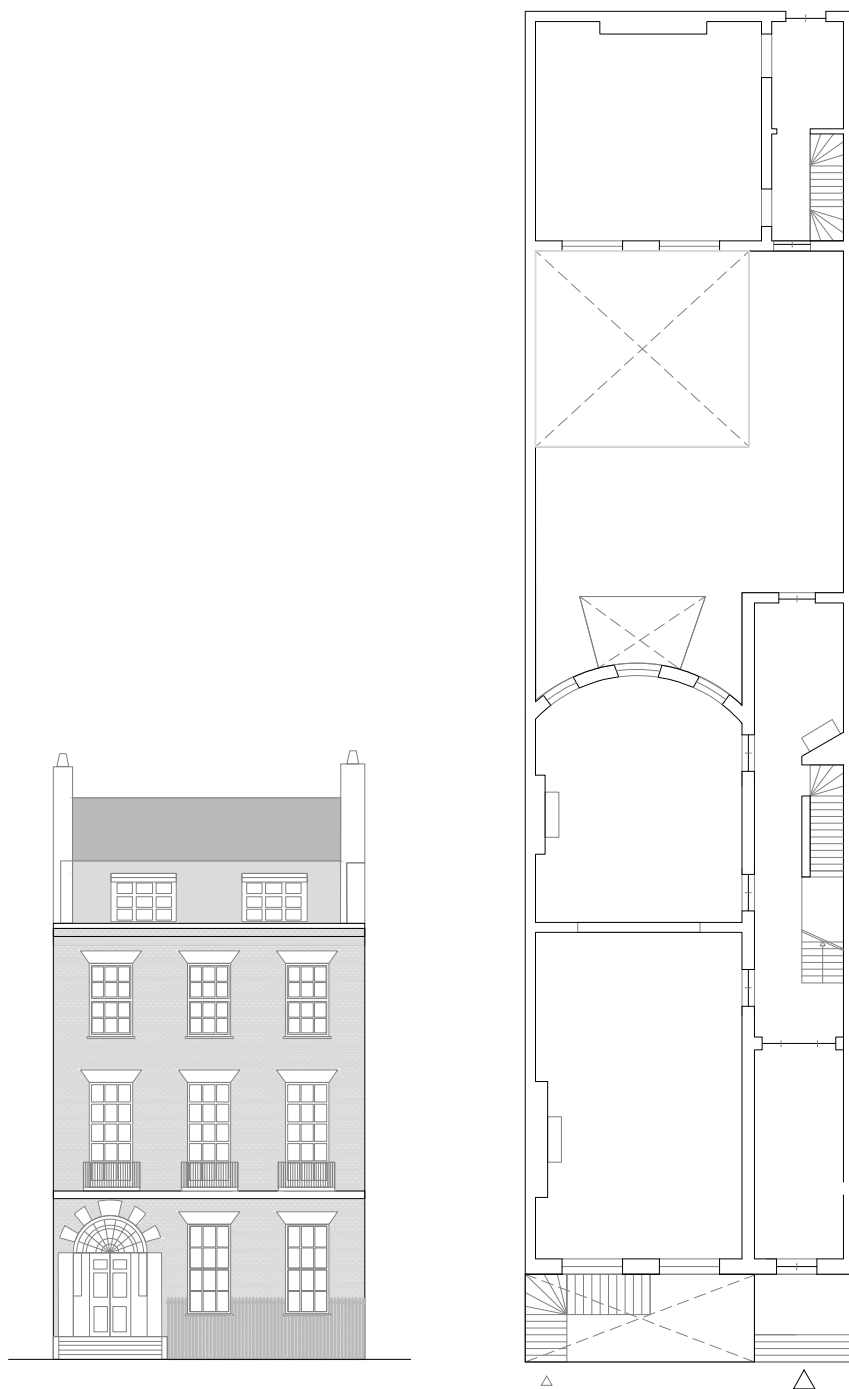


Fig.7
Elevation, Ground Floor Plan, and Section
Terraced House, Bedford Square, 1779

Redrawn by Gianna Bottema



0 1 2 5

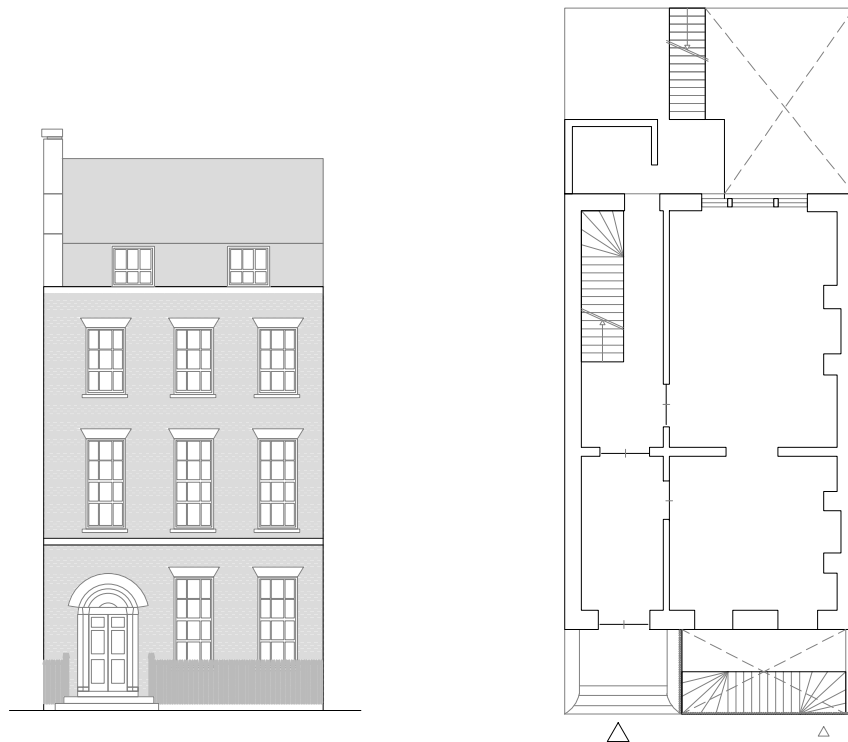
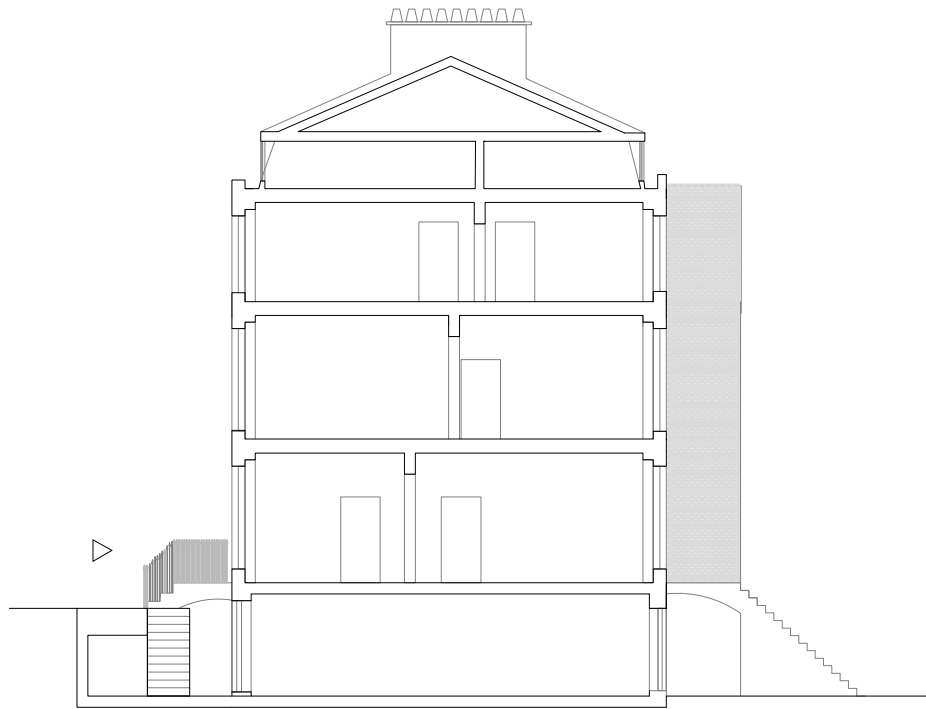
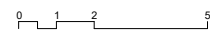


Fig.8
Section, Elevation, and Ground Floor Plan
Terraced House, Gower Street, 1789

Redrawn by Gianna Bottema



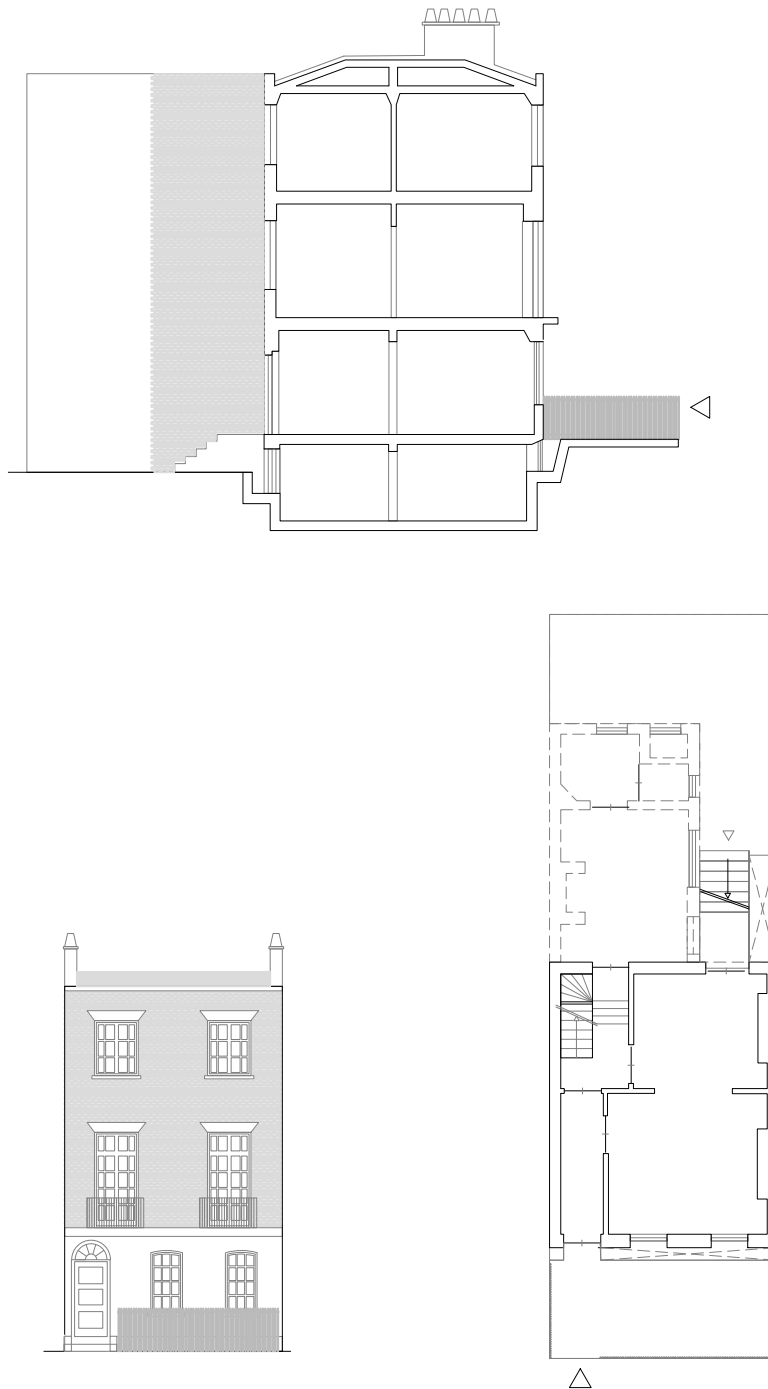
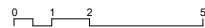


Fig.9
Section, Elevation, and Ground Floor Plan
Terraced House, Edward Estate, 1815

Redrawn by Gianna Bottema



Fig.10
Ground, First, and Second Floor Plan
Terraced House, Alton West, 1959
London County Council, Rosemary Stjernstedt



terraced houses. Their narrow houses with widths of only 3.66 m had stairs located centrally between a front and back room, kitchen and dining room on the ground floor were separated from a living room on the first floor, and three bedrooms were located on the second and third floors (Fig. 10). Similar developments of the post-war period include the four-storey terraces at Gore Road (1966) in Hackney. Built by the Crown Estate to replace bomb-damaged and decrepit properties, the ten houses by John Spence & Partners have basement flats with three-storey terraced houses above (Fig. 11). Their brickwork contrasts with its modernist balconies and large windows and, similar to Alton West, living rooms are on the second floor.

The four-storey housing block in Alexandra Road Estate (1978) by Neave Brown includes three-storey houses with ground-floor garages (Fig. 12). Towards the southern part of the estate, Ainsworth Way comprises three linked rows of three-storey terraced houses. Three-bedrooms are found on the access level, with a sliding dividing wall between two of the bedrooms giving flexibility in their use. The second level has an additional bedroom, the kitchen, and a dining room. The WC with a washbasin is accessed through the bedroom as an en-suite, but also through the kitchen. The upper level has a large living space that opens up to a terrace. Other contemporary interpretations of the traditional terraced house include that of Chillingworth Road in Holloway (2000) by Pollard Thomas Edwards (Fig. 13). This mixed tenure infill development with narrow 3.9 m wide three-storey terraced houses achieves a density of 150 dwellings per hectare, which is higher than the average inner London development at an average of 46 dwellings per hectare.¹⁹

19. According to the Sustainable Residential Quality density matrix (London Plan, 2016), a scheme in an urban setting with a PTAL at 4-6 should have a density range of 45 to 260 units per hectare. See, Three Dragons, *London Plan Density Research: Lessons from Higher Density Development*, Report to the GLA (London: Greater London Authority, 2016), p. 14.

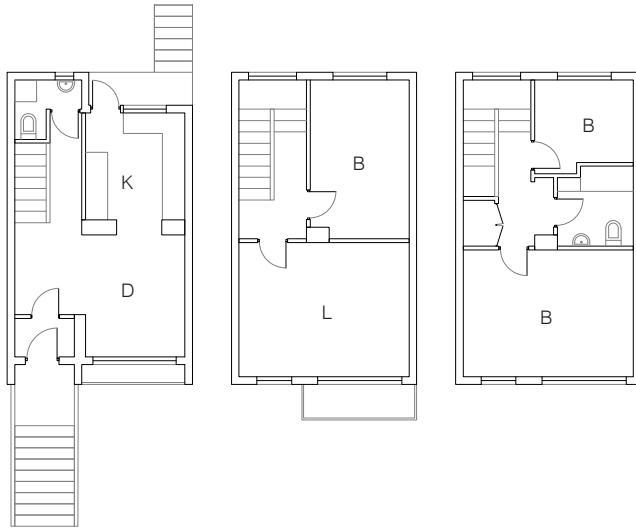


Fig.11
Ground, First, and Second Floor Plan
Terraced Houses, Gore Road, 1966
John Spence and Partners

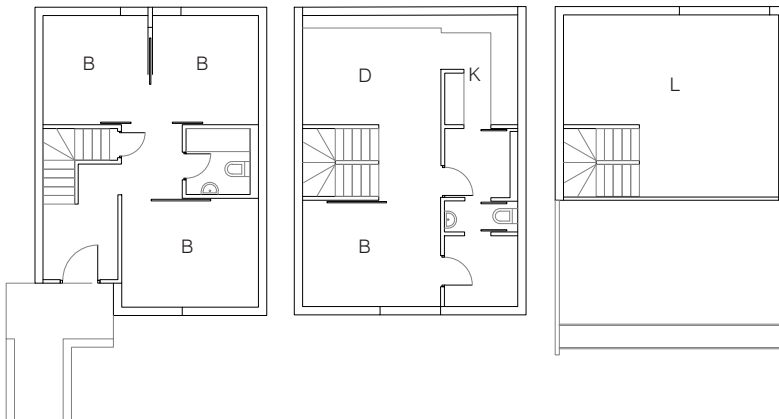


Fig.12
Ground, First, and Second Floor Plan
Block C, Alexandra Road Estate, 1978,
Neave Brown

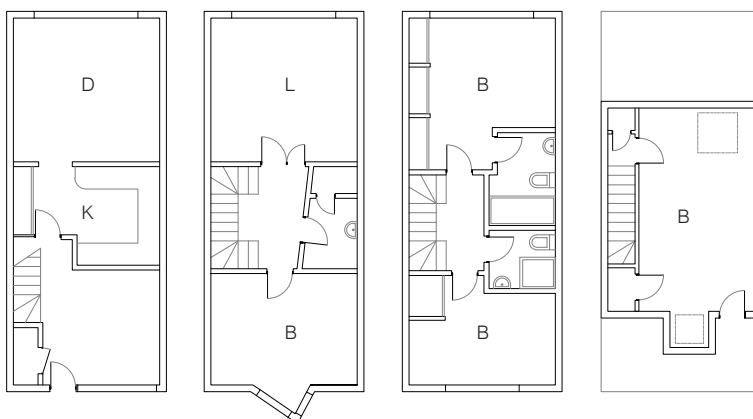
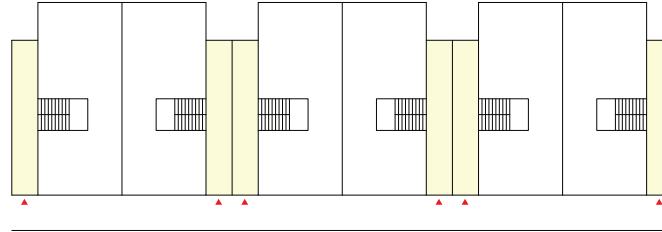


Fig.13
Ground, First, Second, and Third Floor Plan
Terraced Houses, Chillingworth Road, 2000
Thomas Edwards Architects

0 1 2 5

Semi-detached

Three-Storey+ Dwellings



Semi-Detached Houses, Princes Place, 1790

20.
Finn Jensen, *The English Semi-Detached House: How and why the semi became Britain's most popular house-type* (Cambridgeshire: Ovolo Publishing, 2007), p. 26.

A semi-detached house is a dwelling that shares only one party wall with an adjacent one. It differs from a detached house, with no shared party walls, and a terraced house that shares walls on both sides. The earliest references to a semi-detached house are from the seventeenth-century, describing two families living under one roof, a common practice in farming communities.²⁰ At the time, there were a few cases of semi-detached housing in London, but only by the end of the eighteenth and beginning of the nineteenth-century did the semi-detached house become more frequent.

21.
The term 'quasi semi-detached' is mentioned in the London Topographical Record (Volume 27, 1995), RIBA Journal (Volume 106, 1999), and is described by authors Finn Jensen (2007), Philip Santo (2013), Julian Honer, and Andrew Saint (1999).

A precursor to the semi-detached house as we know it today is the 'quasi semi-detached'.²¹ To give individuality to Georgian terraced houses, many builders recessed buildings at the party walls or lowered the height of the building over the main entrance to give the illusion of a house being semi-detached despite being a terraced house.²² An example of this is Camberwell Grove (1770s) in Southwark and Lloyd Square (1832) in Clerkenwell built by William and John Booth. While the symmetrical semi-detached house is the most common, asymmetrical semi-detached houses were also erected to appear as one larger house, usually to project higher social status and wealth.

22.
Jensen, p. 33.

Compared to terraced housing, which normally has two entrances at the front and back, the semi-detached house gives access to the garden directly from the street. This can be seen in London's first suburb in Regent Street, built in 1824 by John Nash.²³ Similar speculative estates of semi-detached houses can be found in Blackheath and Islington. They were large properties with two drawing rooms, a library, a gentleman's room, eight bedrooms, dressing rooms, a cellar, dairy, and coach house. As servants were an integral part of most middle-class households, houses of this period needed a substantial number of rooms to meet prevailing moral and social standards. Babies did not sleep with their parents and children of the same sex but different ages were separated.

23.
Ibid, p. 34.



Fig.14
Semi-Detached 'Villas', Bedford Park Estate, 1877
Edward Godwin

[Draft: Update with high-res image]

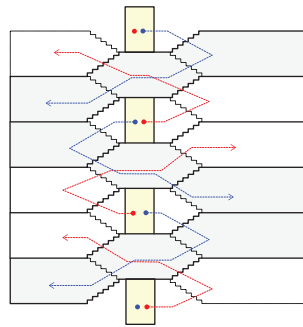
Like three-storey terraced houses, three-storey semi-detached houses were more common during the Georgian period. An early example of semi-detached houses in London is the thirteen pairs built along Kingsland Place during the 1770s. Between the houses, two-storey buildings for coaches and stables are inserted.²⁴ These linked semi-detached houses became widespread and can be also seen in The Paragon in Blackheath (1795–1806) designed by Michael Searles (Fig.) or Paragon Road (1809–1813) in Hackney.²⁵ In Paragon Road, the houses are linked by single-storey colonnades running in front of the buildings and entrance doors. Bedford Park, a suburban development built between 1875 and 1886 in West London, has a combination of three-storey detached, semi-detached, and short terraced houses. Among these are Queen Anne's Grove, Marlborough Crescent, and Blenheim Road, some of which were designed by Norman Shaw and Edward Godwin. Many of these semi-detached 'villas' typologies have three storeys and six to seven bedrooms (Fig. 14).

24. Peter Guillery, 'Waste and Place: Late 18th Century Development on Kingsland Road', in *Hackney History: Volume Six*, ed. by Isobel Watson (London: Friends of Hackney Archives, 2000), p. 23.

25. T F T Baker, *A History of the County of Middlesex: Volume 10, Hackney* (London: Oxford University Press, 1995), p. 18.

Triplex

Three-Storey+ Dwellings



'Up and Over' Triplexes, Corringham Flats, 1962

Three-storey flats, also known as triplexes and in some cases maisonettes, are less frequent. An early example is Albert Hall Mansions (1876–1886) by Norman Shaw, with most flats being spread over one- and two-storey but ground floor flats having three floors.

In low-rise and high-density developments, a combination of one- to three-storey flats are common. Lillington Gardens (1977) in Pimlico by Darbourne and Darke is a four- and five-storey block with a mix of one- to three-storey flats and maisonettes. The three-storey flats are accessed at ground level through private front gardens, while the single- and two-storey dwellings are accessed through a 'roof street' on the third floor. A similar approach is taken in Marquess Road (1977), also by Darbourne and Darke, in which the lower two- to three-storey maisonettes follow a 'crossover' model.²⁶ This layout allows flats to have a double aspect and each room to benefit from a favourable orientation. All three-storey flats are accessed from a private open space in their front (Fig. 15).

The 'scissor' or 'crossover' type of circulation found in blocks of two-storey maisonettes, is also applied to three-storey flats. Scissor flats have interlocking sections and are typically a mixture of 'up' and 'down' flats. 'Up' flats are entered from an internal central corridor and go up a half-storey to the entrance level, which typically contains the kitchen and living room. The next half-storey goes up to a level with the bathroom, directly above the internal corridor of the building, with these spaces tending to have no natural light or ventilation because of this. The next half level up usually provides the bedrooms, located opposite to the living area. The 'down' flat has a similar

26. Oliver Heckmann and Friederike Schneider, *Floor Plan Manual Housing* (Basel: Birkhauser, 2018), p. 250.



Fig.15
 Diagrammatic Sections
 'Crossover' Triplexes, Marques Road , 1977
 Darbourne and Darke



Fig.16
First, Second, and Third Floor Plans
2 Bedroom Triplex, Barbican Estate, 1982
Chamberlin, Powell and Bon

layout but in reverse, with the entrance leading down to the living level, down to a half-landing bathroom, and down again to the bedrooms. This type of circulation can be seen in the 'up-and-over' flats at Willoughby House in the Barbican Estate (1965–76) by Chamberlin, Powell & Bon and Corringham (1960–62) designed by Kenneth Frampton. Although these layouts give dwellings a dual aspect, split-level designs are more expensive and harder to repeat than other dwelling layouts.²⁷

The Ben Jonson House (1973) and Bunyan Court (1972) at the Barbican Estate also include three-storey penthouse flats (Figs. 16-17). Flats and maisonettes are accessed from a central corridor at alternating levels that run to both ends of the block to the stairs and lifts. The entrance level of the penthouses on the fifth floor is single-aspect, while the next levels are double aspect.

27.
Miles Glendinning and Stefan Muthesius, *Tower Block: Modern Public Housing in England, Scotland, Wales and Northern Ireland* (New Haven: Yale University Press, 1994), p. 145.

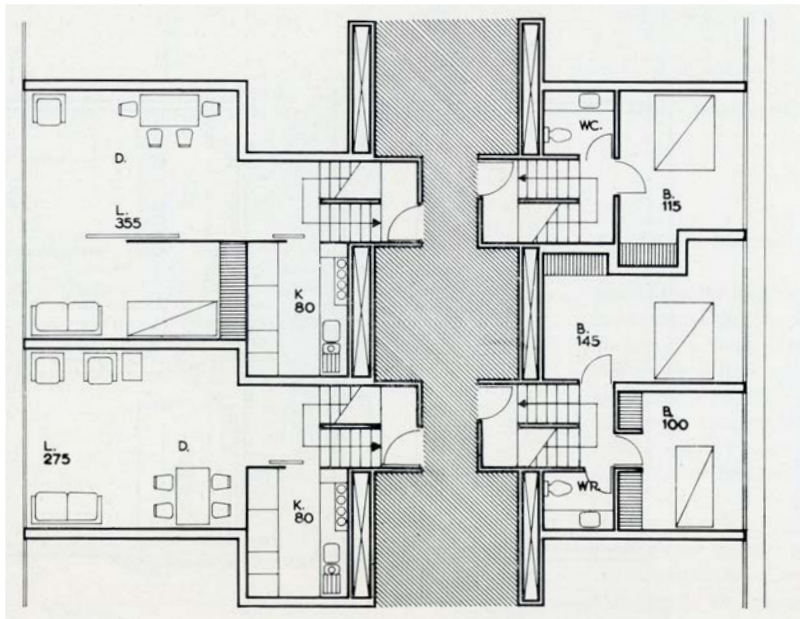
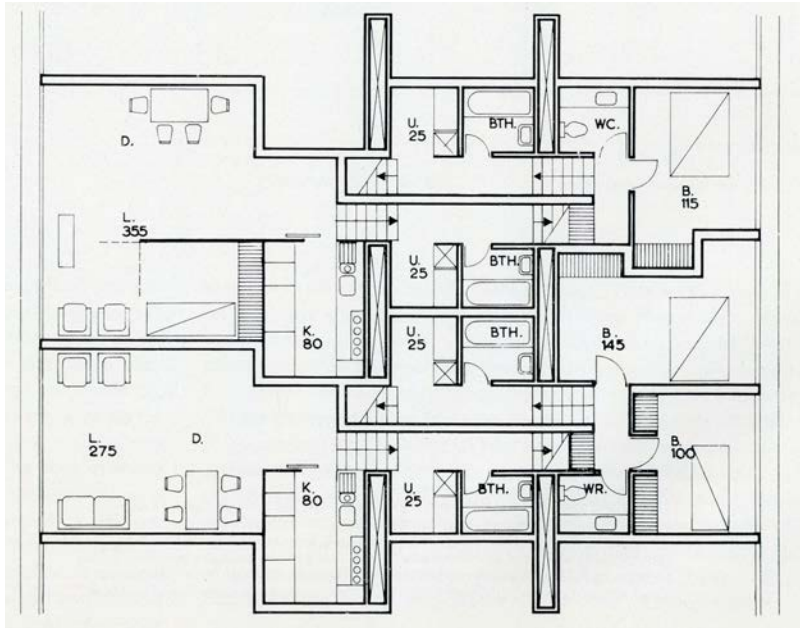


Fig.17
First and Second Floor Plans
Willoughby House, Barbican Estate, 1976
Chamberlin, Powell and Bon

Two-Storey Dwellings

A two-storey dwelling refers to any unit organised across a lower and upper floor level and connected by an internal staircase. Two-storey building and dwelling typologies such as terraced and semi-detached houses have a long tradition in London and the UK. In fact, it could be said that their design shaped that of single-storey dwellings, with spatial orders, layout, and functions from houses later adopted in bungalows and flats alike. Thus, while much of the innovation in single-storey dwellings occurred around access types and problems of the spatial organisation at the block scale, the development of two-storey dwelling plans is largely related to innovations in domestic functions, services, and room types.

Over time, the rectangular housing plan has seen variations in the width and depth. However, the layout and juxtaposition of rooms within two-storey dwellings have changed comparatively little due to the persistence of traditional housing hierarchies based on social norms and functional association of rooms. In middle-class homes, layouts and room types were commonly adopted from larger upper-class homes, but often combining less essential functions due to reduced space. Thus, even though rooms would be labelled the same, expressing social aspirations, their functions could widely vary. This has resulted in an overlapping of functions within rooms and blurred room names and definitions, for example, the sitting room would be used also as a dining room and even for some cooking.

Often grouped with single-storey flats due to similar access and circulation types, the maisonette is a more contemporary model of two-storey dwellings. While terraced and semi-detached houses are 'directly' entered from the street, the maisonette uses a more diverse range of access. This normally falls, similar to single-storey dwellings, in the access categories of 'direct in pairs' (staircase access), exterior 'access gallery', and internal 'access corridor'.

The Changing Design of Rooms

While some spatial elements in the home have evidently evolved, other changes are more subtle, such as that of minimum floor-to-ceiling heights. The Victorian house had an average clear room height of 2.74 m on the ground floor and 2.62 m on the first and subsequent floors. In contrast, the *Tudor Walters Report* (1918) and *Dudley Report* (1944) specified a ceiling height of 2.44 m within two-storey dwellings, and the current *Nationally Described Space Standards* (2015) permits a minimum 2.3 m, whereas the London Plan of 2016 requires 2.5 m for at least 75% of the gross internal area. It is apparent from further regulations such as *Part K: Protection from Falling, Impact and Collision* (2013) that staircases are pivotal to design considerations linked to floor-to-ceiling heights. Just as ceiling heights have been increasingly regulated, so too have the rise and going of staircases determining the length of stairs, with both having a noticeable effect on plan layouts (Fig. 18). This includes the placement of stairs, corridors, and halls as part of a required means of escape to a final exit from all habitable rooms (*Part B: Fire*), which can affect the depth of the building as a whole as well as the space available for each room.

The association of the first floor or 'upstairs' with bedrooms in two-storey dwellings was well established by terraced houses with typically two to three bedrooms. The third bedroom, usually placed on top of the scullery extension, was considered essential by social reformers, as it enabled children of different sexes to be separated. Moreover, as recognised by the *Tudor Walters Report*, the provision of a fourth bedroom would only be possible in a large house with a parlour or in a third (attic) storey (Fig. 19). The report stipulated that all bedrooms should be able to accommodate a 4 ft bed (a double bed) and at least two of the bedrooms should have a fireplace to prevent illness. The *Dudley Report* recommended additional minimum space standards, advising that the first bedroom be large enough to also accommodate a cot bed. While the provision of bedrooms was largely argued based on moral concerns, this was less prominent in post-war reasoning that increasingly focused on issues around privacy and personal space. This is evident in the proposed new furniture layouts that included desks and built-in storage in bedrooms. This shift in design reasoning is especially visible in the *Parker Morris Report* (1961) recommending that all adolescent and adult children should have separate rooms, regardless of their sex.

The ground floor of Victorian terraces, especially in cases with only two rooms, the traditional arrangement was a parlour in the front room and a combined kitchen-living-scully in the back room. In homes with three rooms, the front room would be a parlour and the back room a kitchen-living room, with a scullery placed in the rear extension (closet wing). This mix and overlap of functions often brought confusion to the conventional names of the rooms.²⁸ The scullery was, like a wet kitchen, used for food preparation, washing up, and laundry – activities requiring the use of water.

28.
Ravetz, *Place*, p. 164.

See paras 1.2–1.3

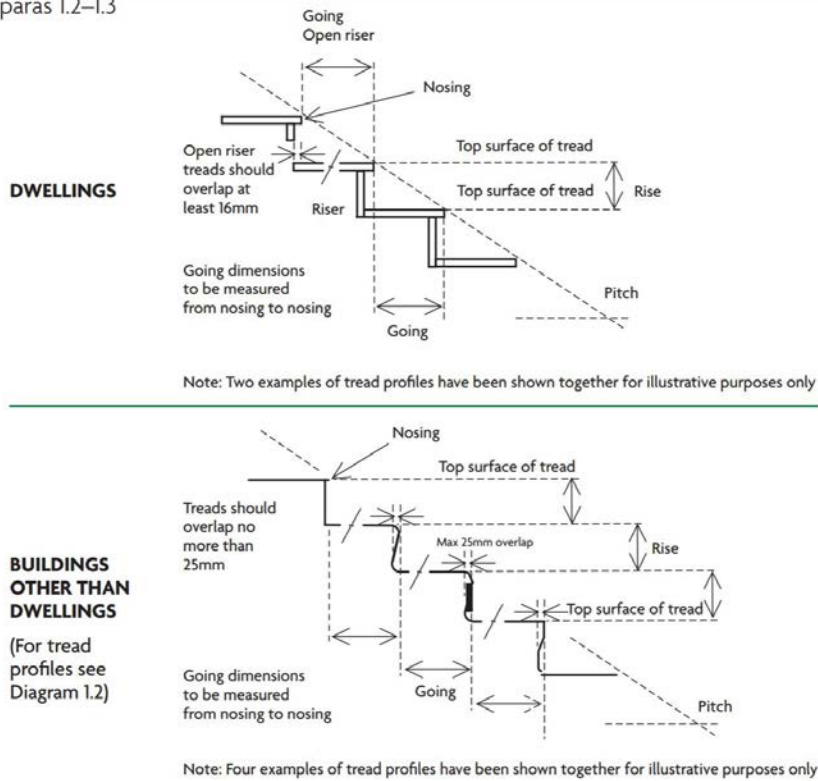


Diagram 1.1 Measuring rise and going

See para 1.11

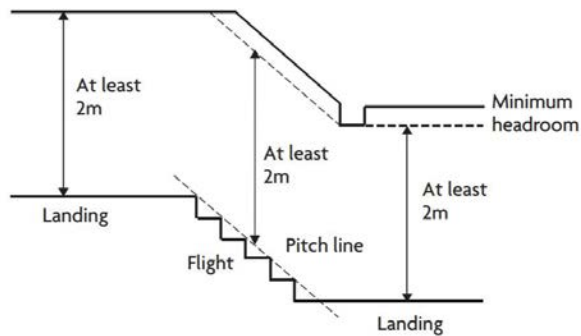


Diagram 1.3 Minimum headroom

Fig.18

Approved Document K: Protection from Falling, Collision, and Impact
Ministry of Housing, Communities and Local Government, The Building Regulations, 2010

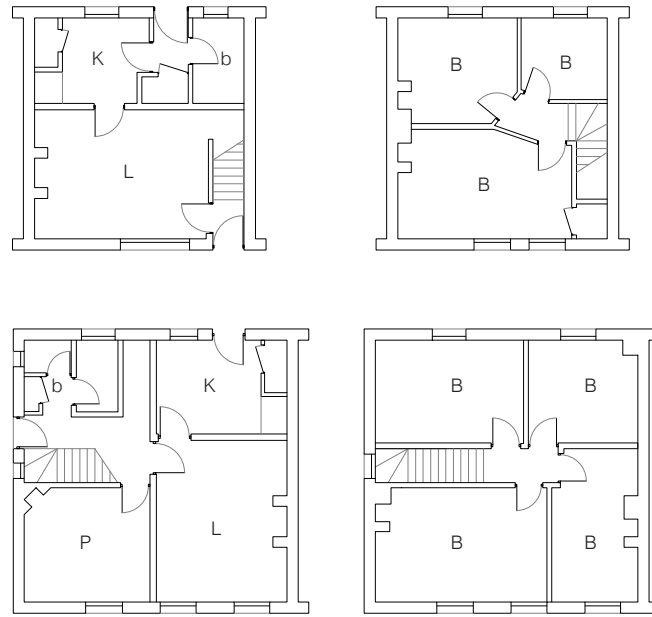
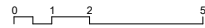


Fig.19
Ground and First Floor Plans
3 and 4 Bedroom Houses, Chapel House Estate, Poplar, 1921
Office of Works, Sir Frank Baines



Laundry would be done in a ‘copper’, a large metal tub with a heat source in which clothes would be boiled unless a house had access to a separate, shared washhouse. The scullery sink would not hold water itself but rather buckets and bowls of water. The kitchen had a coal cooker or later a space-heating grate with sometimes an oven above.²⁹ It was common for the bathtub to be in the kitchen – a zinc tub heated by a fire that could be hung on the wall after use. In larger houses, food storage would be in pantries, cellars, and larders, but in smaller houses, people would buy their food on a more daily basis. Bye-law terraced houses had to be provided with a larder with a ventilated panel.³⁰

The *Tudor Walters Report* observed an important transition in the use of sculleries and kitchens: ‘the kitchen becomes the living room in the ordinary sense, which may be kept for use as a sitting-room, a meal room and for cleaner activities of the family’.³¹ The scullery would continue to be used for cooking and laundry but some cooking and eating were also moved to the second main room (sitting room), with the Tudor Walters Committee discussing whether to enlarge the scullery to prevent people from eating and cooking in the same room. In defining the kitchen-scullery dichotomy as a moral dilemma, the committee failed to see that the working-class wanted two day rooms in addition to a multifunctional kitchen. The committee emphasised instead that the parlour or living room should not be reduced

29.
Ibid, p. 165.

30.
The *Tudor Walters Report* adhered to this, but in later years, the larder would often be demolished to enlarge the kitchen.

31.
Tudor Walters Committee, *Tudor Walters Report* (London: United Kingdom Parliament, 1918), p. 87.

THE WORKING-KITCHEN HOUSE

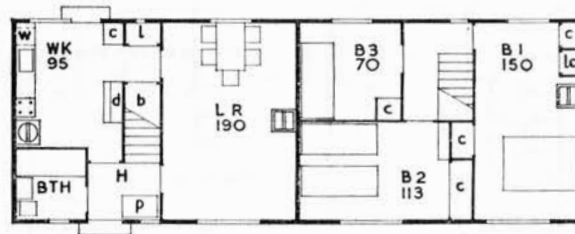


FIG. 62. A small house with a living room running through from front to back, useful for grouping in terraces. For household of 5: 800 sq. ft. Frontage 23' 10"; depth 16' 9".

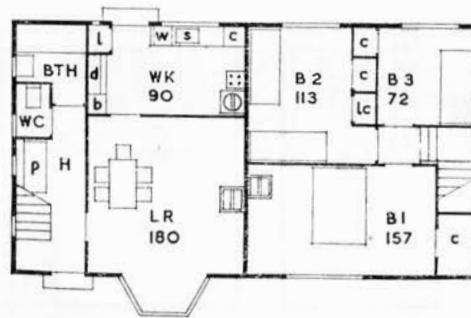


FIG. 63. In this arrangement a general plan similar to that shown in Fig. 60 has been adapted to fulfil the requirements of the working kitchen type. For this, little more space is needed. For household of 5: 814 sq. ft. Frontage 19' 0"; depth 21' 0".

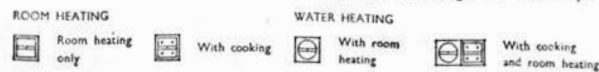


Fig.20
The Working-Kitchen House
Ministry of Health and Ministry of Works, Housing Manual, 1944



Fig.21
Interior View of Kitchen
Prefab Kitchenette, Excalibur Estate, 1947
Ministry of Works

32.
Ibid, p. 86.

33.
Office of Population Censuses and
Surveys, *General Household Survey*
(London:HMSO, 1971), p. 76.

34.
Percy Gray and R. Russell, *The
Housing Situation in 1960: An inquiry
covering England and Wales* (London:
HMSO, 1962), p. 62.

to accommodate a larger kitchen, and ‘where it is not possible to provide except in this way, we recommend that it be omitted’.³² The discussion about which room people should use for eating would last until the late twentieth-century.³³

The interwar kitchenette had a back door to the side driveway or back garden, and sometimes a serving hatch to the back room if used for dining. It combined all the food preparation functions of scullery and kitchen but had no space for a table and chairs. This configuration was favoured, as it combined essential housekeeping functions in one space. The laundry remained in the scullery but was later moved into the kitchen with the arrival of a ‘twin’ tub laundry machine that could connect to the sink tap, which however interrupted the use of the kitchen sink. Once wet work and cooking were finally brought together, the question was what size of a kitchen is appropriate. The size determined whether it was suitable for eating, which established in turn if it was classified as a habitable room and affected the assessment of overcrowding in a dwelling.³⁴ Despite being small, the kitchenette was deliberately placed to permit monitoring all circulation in a home, as the front door, hall, stairs, and back garden could be surveyed from its location. But with larger washing machines and dishwashers, the kitchenette seemed increasingly unsuited for modern life (Fig. 21).

The *Housing Manual* of 1944 standardised plans and rethought the relationship between cooking, eating, and living in the home (Fig. 20). In one layout, the kitchen was designed only for cooking, with meals taken in a dining area in the living room. In another, the kitchen had enough space for both dining and cooking, with only a smaller living room provided.³⁵ The Parker Morris Committee acknowledged that people regularly ate in their kitchen and needed therefore a suitable area in it. But it suggested that in larger houses, it would be desirable to have a separate room for dining as well as ‘for entertaining, and activities needing privacy’.³⁶ Its report further commented that even in modern houses, the kitchen ‘retains some of the character of nineteenth-century scullery’ due to the multiple uses it can have.

The terraced housing typology appeared before basic sanitation provisions became standard and the bath moved out of the kitchen into a separate bathroom, typically located at the end of a rear extension on the ground floor or a first floor half landing.³⁷ It was subsequently in the interwar period that the bathroom made its way to the first floor, with the *Tudor Walters Report* advocating having an upstairs bathroom, as shown in some of its type plans. By 1919, all new council housing had a separate bathroom, typically located on the first floor above the kitchen, with the bath and sink in one compartment and the toilet in another. Some bathrooms began to have both cold and hot water taps and, from the late 1930s, water for baths was often heated by a back boiler although many still heated it in pans or kettles in the kitchen on the ground floor.³⁸ To modernise houses built before 1914, a bedroom or the scullery was typically converted into a bathroom. The *Dudley Report* thus suggested that homes with more than four occupants should have both an upstairs bathroom and downstairs toilets with a washbasin. The *Parker Morris Report* later stated that the benefits of providing hand-washing facilities immediately next to the WC were based on substantial medical evidence.³⁹ The provision of a WC at entry or principal level is today mandated by *Part M: Access and Use of Buildings* (2020) of the Building Regulations, which requires them to be a minimum 0.85-0.9 m wide, provide a clear access space of 0.75 m length in front of the toilet, have a door opening outwards, and accommodate a washbasin.⁴⁰ The regulations further state that in standard ‘visitable dwellings’ reasonable access, including for wheelchair users, must be provided to enter a dwelling and access habitable rooms. Access requirements have, especially if designed to more onerous accessible and adaptable standards such as dwellings for wheelchair users, a direct impact on the size (width) of circulation spaces, size and location of doors, location of spaces such as WC and bathroom, internal room sizes, and the width of the dwelling as a whole.

35. This second option was to have a separate utility room for laundry.

36. Parker Morris Committee, *Parker Morris Report: Homes for Today and Tomorrow* (London: Ministry of Housing and Local Government, 1961), p. 10.

37. Levitt and McCafferty, p. 38.

38. Ravetz, *Place*, p. 144.

39. Parker Morris Committee, p. 12.

40. At the same time, *Part G: Sanitation, Hot Water Safety and Water Efficiency* (2016) states that sanitary conveniences do not require a separating lobby, e.g., between a bathroom and a kitchen or food preparation area. While this does not suggest a return to the origins of the bath within the kitchen itself, it indicates some flexibility that was absent in regulations during the late twentieth-century.

Utility Services in the Home

With gas supply first becoming available in middle-class homes around 1850, by the 1890s it was relatively common to have a gas supply with a coin meter.⁴¹ Gas cookers became widely used and could be rented from gas supply companies. One issue initially holding back the adoption of gas cookers was the importance given to the family Sunday roast, with roasting traditionally done in front of an open fire. The gas cooker underwent several improvements, including detachable parts and a thermostatic heat control introduced in 1915, before becoming a standard household appliance. In middle-class interwar homes, it was also common for the two main bedrooms and one of the day rooms to be fitted with gas heaters.

First available in the 1880s, electricity was initially used for lights and telephones in upper-class homes. A significant change came after World War I, when the number of homes with electricity doubled from one in three around 1930 to two in three by 1939. Under the Electricity Act of 1947, the cabling of streets and wiring of homes made electricity available to 90% of homes.⁴² Similar to gas, electricity could be bought through penny slot meters, and until the end of World War II, meters were read from the outside of the home. A large increase in the use of electricity for cooking came in the period between the wars. Local authorities began to rent out cookers and heaters to their tenants, leading to a rapid rise in their sales as well as that of toasters, kettles, and small appliances from the 1930s onward.

Before World War II, newer houses used a mix of gas and coal for heating and cooking but had limited electricity. Central heating has been used since the early nineteenth-century in England, with its residential application first found in large terraced houses and public buildings with central furnaces. But it was not until the 1950s that central heating was common. By 1960, half of Greater London had central heating, both using oil and gas. With expanding use of electricity, in 1971, over one-fifth of all central heating utilised an electric storage heater, which was practical but expensive to run. Central heating allowed more flexibility in the design of a home, as room layouts no longer depended on the position of chimneys. As terraced houses became a dominant housing typology in London, chimney stacks were efficiently placed next to party walls, permitting the heating of rooms from the sides rather than the corners as in earlier housing. The main heating source of a Victorian terraced house was coal. This had a significant impact on housing design to enable delivery, storage, and removal of coal and its ash, and hearths and flues had to be installed throughout a dwelling. The hearth, as Hermann Muthesius observed, was characteristic of the English house and the most important element of a room, even in the poorest household: an 'English room without a fire is like a body without a soul'.⁴³ The hearth brought family life together and the mantelpiece was used to display treasured possessions. Although Muthesius deemed the hearth less economical than a stove, he believed the mild English climate made central heating less of a necessity.

41.
S Muthesius, p. 53.

42.
Ravetz, *Place*, p. 133

43.
H Muthesius, p. 181.



Fig.22
Model of a bathroom unit
Dame Jane Drew, 1939, RIBA

[Draft: Update with high-res image]

Water supply was the last of the utility services to enter the home. Although water closets predated the sewer system, due to cost, they were mainly used by the upper classes and required the installation of individual cisterns, tanks, and pumps.⁴⁴ At the beginning of the nineteenth-century, private water companies began installing water-carriage systems. Depending on the district some properties had access to water on tap and others were still dependent on domestic cisterns and constant supply. It was also common for people to access sanitary facilities away from home. Bathhouses played an important role during Victorian times, serving nearly 1.5 million bathers in 1891.⁴⁵

London's sewer system was built in 1858, and by 1875, local councils were responsible for providing sewers, although developers were the ones who built them to specifications set out in bye-laws.⁴⁶ By 1914, most dwellings had a piped water supply, which changed the design and layout of bathrooms and kitchens. However, homes often had only one water supply, even in shared houses. The post-war hot water systems were as diverse as heating and kitchen appliances, with coal-fired boilers still common in semi-detached homes, especially those with a living kitchen or morning room where they could be placed and ventilated. While bathrooms and kitchens represented an advance in living standards, they also were expensive with standardisation of fittings and connections during the interwar period increasing efficiency and lowering the costs.

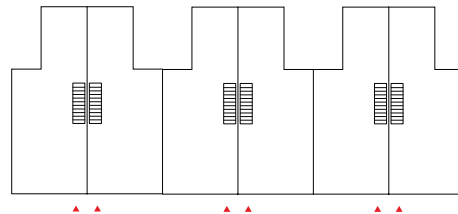
44.
Barbara Penner, *Bathroom* (London: Reaktion Books, 2014), p. 51.

45.
Ibid, p. 70.

46.
S Muthesius, p. 56.

Terraced Houses

Two-Storey Dwellings



Terraced Houses, Shaftesbury Estate, 1876

With a growing middle class in the Victorian era (1837–1901) at the wake of the Industrial Revolution, terraced houses became less grand, typically consisting of two-storey buildings with two rooms per floor. Common variants included further floors on top, basements below, or extensions to the rear.

Industrial cities such as Birmingham, Manchester, and Leeds erected ‘back to back’ terraces to house the growing working population in the late eighteenth century to the early twentieth century. Rather than having both a front and back door, ‘back to backs’ only have a front door and share party walls on three sides. These developments were, however, rare in London, as ‘back to backs’ were prevented by the Metropolitan Act of 1844, which stipulated a minimum size of 14 m² for the backyard (not including outdoor toilets).⁴⁷ The Public Health Act of 1858, crucially defined the standard street width of new developments as 36 ft (11 m) and the distance to the next building was required to be no less than its height. Working-class housing increasingly took the form of ‘by-law’ terraced housing, as the name implies, they complied with building regulations and had separate sanitation and water supply, a measure introduced by the Public Health Act of 1875. To ensure natural daylight in terraces, the surfaces of windows had to equate to at least 10% of the internal floor area.

47. Joanne Harrison, ‘The Origin, Development and Decline of Back-to-Back Houses in Leeds, 1787-1937’, *Industrial Archaeology Review*, 39.2 (2017), p. 106.

The Public Health Act of 1875 also encouraged local authorities to produce their own bye-laws, resulting in regional variations of terraced houses. The typical Victorian two-room and two-storey layout of terraced houses could be organised in many ways. A depth of two rooms allowed a functional and social separation between the front and back of the house and between public and private. A clear spatial hierarchy was established, with each floor assigned a distinct function. On the ground floor, placed in the front of the building next to the entrance, was the parlour, where visitors were greeted. This room could be joined with the dining room to its back by opening folding doors. The Victorian parlour occupied an important position within the house used on formal social occasions and Sundays. It was a highly-decorated space, heavily rooted in English traditions as representative of status and wealth, however, it was also used for storing larger objects such as a sewing machine or pram.

Yet the parlour was opposed by modernisers such as Raymond Unwin, who argued that it was functionally obsolete and took up space unnecessarily in a small working-class home. By 1914, the parlour started to be used as an everyday sitting room by the middle classes. This change in habits also reflected on the cost of maintaining the parlour and the need for servants to keep coal fires burning. Between the wars, gas fires, for those who could afford them, brought the front room into more frequent use. The *Tudor Walters Report* (1918) still regarded the parlour as the most important room in the home but was aware of the cost of maintaining it, thus providing housing plans without one. When the Housing Act of 1923 reduced gross floor areas for subsidised houses, the parlour was the first to be eliminated, as for every 9 parlour houses, 12 non-parlour houses could be built.⁴⁸ The *Dudley Report* (1944) produced subsequently three alternative ground floor plans, only one of which had the traditional living room, scullery, and third room, which it now termed 'sitting room' on the grounds that 'the expression "parlour" carries an implication which is old-fashioned and obsolete'.⁴⁹

Similar to having a parlour, a further critical social distinction in terraced houses was whether the ground floor had a hall separating front door and front room.⁵⁰ A hall passage could also give independent access to the back room and rear extension and, if it contained the staircase, to the upper levels of a house. Houses without a hall and instead direct access to the front room from the street were usually small in size. An intermediate solution between houses with a hall passage and those without was having a corridor along the front room only. With this 'half-hall' entrance, one had to cross through the main room at the back to get to the rear extension (Fig.). Post-war terraced houses restored the hall to more generous proportions and its traditional function of providing access not only to the upstairs but also to the ground-floor rooms through a corridor, although the working kitchen was sometimes only accessible through the dining room. The hall was now given enough space for storage, such as a place to put a pram.

48.
Ravetz, *Place*, p. 167.

49.
This was mainly proposed for rural areas. See Dudley Committee, *Dudley Report: Design of Dwellings* (London: HMSO, 1944), p. 14.

50.
Ravetz, *Place*, p. 73

The ground-floor arrangements of terraced housing were further experimented with to suit modern lifestyles. In Alton West (1959), the kitchen is placed in the front room facing the street while the living room to the rear is open to a back garden. Thus, the main living room had moved from its Georgian location on the first floor to the front room of Victorian houses and the back room in some modern dwellings. Moreover, as recommended by the *Dudley Report*, in addition to the upstairs bathroom, a WC was placed on the ground floor. In Ravenscroft Road (1964) built by the Ministry of Housing & Local Government, terraced houses had a single bedroom to the front that could be used as a spare bedroom or added to the dining and living room.

In London, suburbanisation began already during the eighteenth-century. This was due to a growing middle class choosing to live in new terraced housing but in more remote suburban areas. The lower classes followed into suburbia in the nineteenth-century, when work and living places became increasingly distributed across the city. Rows of speculative brick-terraced houses were erected close to a factory or in areas where train connections made commuting viable, such as Battersea. Likewise, standardised terraced houses were built in commuter suburbs, Noel Park being one of the first, developed by the Artizans, Labourers and General Dwellings Company (1881–1913) and designed by Rowland Plumbe. Colloquially called a ‘two up, two down’ or ‘through’ house, these terraces had a front and a back room each with a window on the ground floor and two bedrooms upstairs. If a third bedroom was provided, this was placed on top of a rear extension covering less than the house’s full width to ensure that the back room could still receive natural light. Normally, such an extension would also accommodate a scullery or kitchen. These houses also had a yard to the back and an outdoor toilet at the rear. The majority of the houses were basic and had no hall or half hall nor a basement or attic.

In the twentieth century, the terraced house witnessed further changes to its design. From 1890 onward, speculative houses in the outer London suburbs eliminated the rear extensions. This meant houses were built slightly wider than previously (the narrowest only having measured 5.2 m in width) and the hall was wider but shorter. The stairs were placed closer to the entrance, leaving more space for the kitchen located in the back (Fig. 23). This followed the recommendations of the *Tudor Walters Report* (1918) that warned against narrow-fronted houses with rear extension and recommended shorter terraces with wider frontage. Apart from the desire to have larger gardens, socio-economic considerations are likely to have led to these smaller plans. Existing medium-sized terraced houses in London were often occupied by more than one family, who could not afford the rent of a full house. In fact, in 1911, 40% of families in London shared a house.⁵¹ By 1921, a fifth of English families still shared dwellings, including 6% who lived three or more families to a dwelling.⁵² The new smaller terraced house was equivalent to just over half a standard-sized terraced house with a rear extension, therefore purpose-built to the needs of just one family.

51.
S Muthesius, p. 3.

52.
Ravetz, *Place*, p. 77.

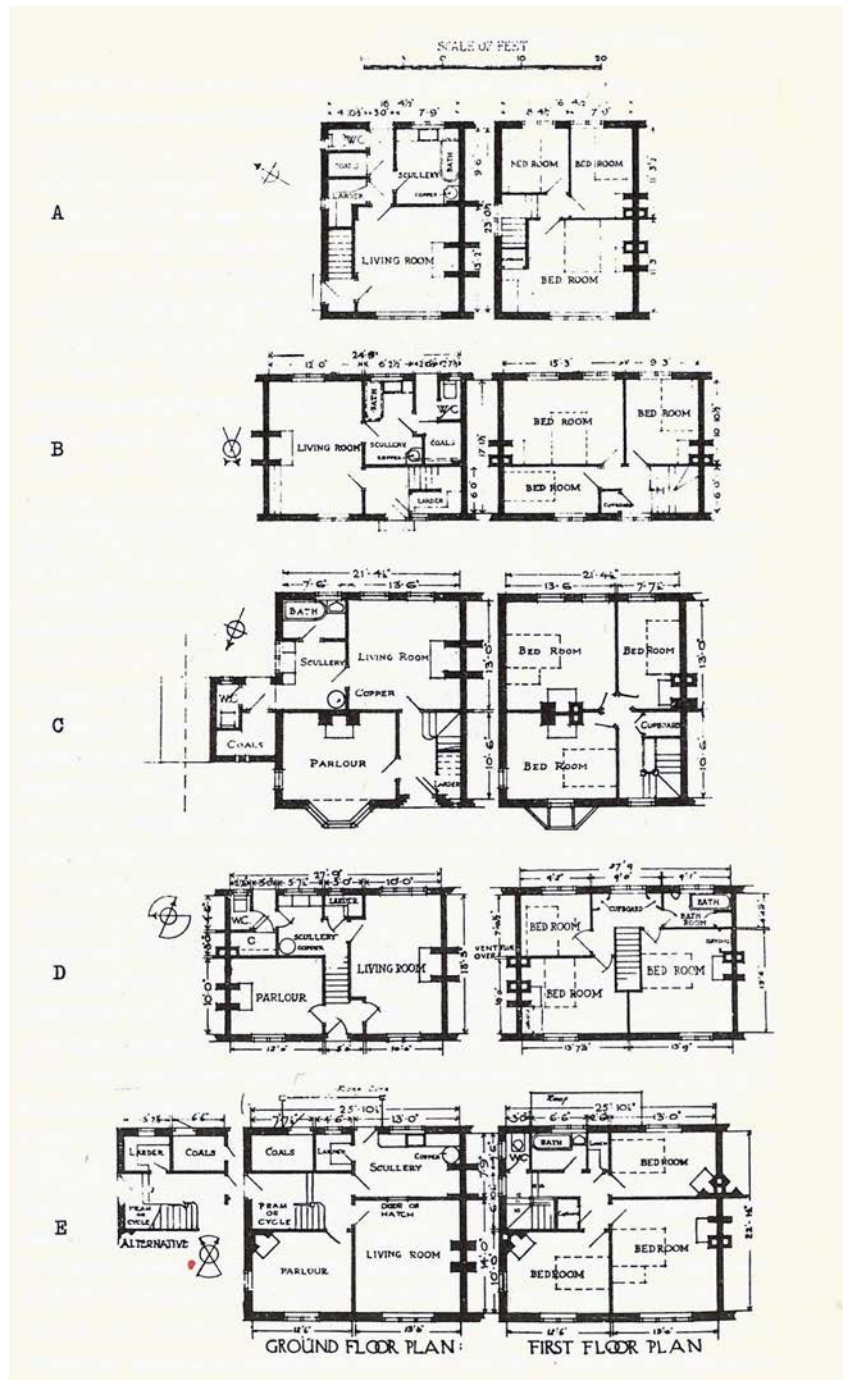


Fig.23
Recommended Type Plans
Tudor Walters Committee, *Tudor Walters Report*, 1918

53.
Valuation Office Agency, 'Dwellings by Property Build Period and Type'.

54.
Binney, p. 13.

55.
Levitt and MacCafferty, p. 36.

56.
The Heritage Council, *Built to Last: The Sustainable Reuse of Buildings* (Dublin: The Heritage Council, 2004), p. 4.

57.
English Heritage, *Regeneration and the Historic Environment: Heritage as a catalyst for better social and economic regeneration* (London: English Heritage, 2005), p. 2.

Even though terraced houses were in 1911 the predominant housing typology in England, making up 87% of housing compared to 27% today,⁵³ their popularity varied throughout history. *Chambers' Encyclopaedia* complained in 1904 that 'town houses in streets lost their distinctive qualities, being all designed so as to form as it were one flank of an extensive palace or single edifice. This monotonous arrangement is now being gradually departed from, and each house is beginning to be designed, as it should be, independently.'⁵⁴ According to the *Tudor Walters Report*, standardisation had included carpentry and joinery and the overall style of the house but fell short of practical elements such as plumbing. David Levitt's *Housing Design Handbook*, for example, states: 'From several points of view – urban design, economy of construction, environmental performance, and land use – the terraced house remains the most relevant compromise between the desire of family-size households for space and independence and the unalterable need to regard land as a scarce resource.'⁵⁵

During post-war reconstruction, adapting existing terraced houses was also supported by grants. The first effective action for housing improvement was the Standard Grant of 1959 for houses with at least fifteen years of use left, which could be used to install five modern amenities: a bathroom with bath or shower, a wash hand basin, cold and hot water supply, a WC, and a food store. The Heritage Council found that the cost of maintaining and inhabiting a Victorian terraced house over 100 years is almost 30% cheaper than that for a house built in the 1980s.⁵⁶ Another report by English Heritage found that repairing a typical Victorian terraced house uses 40-60% less energy than replacing it with a new home.⁵⁷

Over the years, terraced houses have been subject to a variety of different design approaches to width, depth, orientation, and appearance, all of which ultimately relate to questions of density, space standards, and usability. Many of these designs, however, would not meet today's building regulations. For example, building regulations laid out in *Part A: Structure* (2013) dictate that the maximum floor area enclosed by 3 or 4 structural walls should be no more than 36 m² and 70 m² respectively. This not only determines structural considerations when constructing party walls, but also the overall building size and layout of internal spaces that can be non-loadbearing. Open plan layouts thus are less viable and the need to meet building regulations can be said to have influenced a more rigid spatial demarcation and compartmentalisation of rooms within the home.

While an increase in building width can improve natural lighting and ventilation, it can also reduce the number of dwellings and density. There is a point when increasing the building width and the span between party walls is

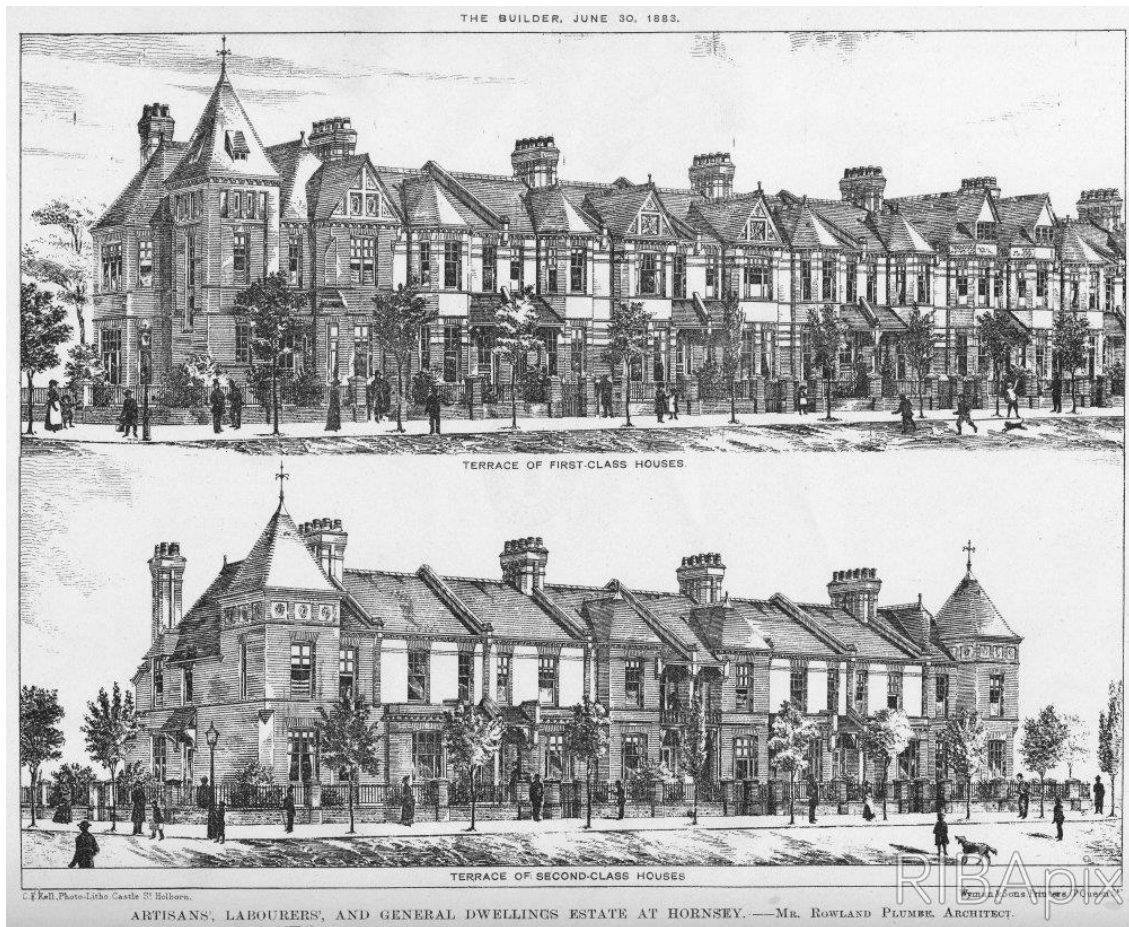


Fig.24
Drawing of First and Second Class Terraced Houses
Artizans', Labourers', and General Dwellings Estate, Hornsey, 1883
Rowland Plumbe

[Draft: Update with high-res image]

not economical, as at some point secondary structure is needed. In addition, based on thermal performance criteria, a terraced house is more efficient than a detached house due to the ratio of the internal area to external walls. However, environmental performance in a terraced house is at the same time closely linked to urban design and the shape of the site, which often prevents an optimum solar orientation due to the internal layout remaining the same regardless of building orientation. Thus, building regulations and housing standards have a multitude of effects on how buildings are designed and which building layouts are more efficient in meeting the various technical requirements in addition to social and economic considerations.

Semi-detached

Two-Storey Dwellings



Semi-Detached Houses, Chapel House Estate, 1921

58.
Graham Towers, *At Home in the City: Introduction to Urban Housing Design* (Oxford: Architectural Press, 2005), p. 95.

59.
Department for Communities and Local Government, *English Housing Survey: Housing Stock Report* (London: Department for Communities and Local Government, 2010), p. 8.

60.
Valuation Office Agency, 'Dwellings by Property Build'.

Although semi-detached and terraced houses are very similar in size, layout, and function, they also have notable differences. Terraced houses can be built at densities from 45 dwellings per hectare – even though some Victorian terraced housing was built up to 125 dwellings per hectare – whereas semi-detached houses are mostly built at a density of 16-30 dwellings per hectare.⁵⁸ In England, today 27% of all dwellings are semi-detached houses⁵⁹ and in London, semi-detached houses make up 13.5% of the housing stock.⁶⁰

At the beginning of the nineteenth century, buildings in the city centre were largely made up by a combination of civic buildings and Georgian terraced houses inhabited by wealthy tenants. Surrounding this centre was a mixed area, also predominantly consisting of Georgian terraced houses, but with multiple occupancy and some industries such as breweries, brick works, gas works etc. Beyond this zone, considered the inner suburbs, were the bye-law terraced houses built in Victorian times largely for the working class. Meanwhile, the outer suburbs were considered the domain of middle-class families living in semi-detached houses.

Therefore, during the Industrial Revolution (1760–1840), very large estates of modest two-storey terraced houses were built to accommodate the growing workforce of industrial Britain. Concurrently, suburbs sprang up on the outskirts of major cities. Industrialisation created a new and wealthy middle-class that opted for the semi-detached house as a compromise between the villas of the rich and basic terraced housing for workers. By 1850, one-sixth of the Victorian population in England and Wales could be termed middle-class.⁶¹ The lower-middle class lived in basic semi-detached houses,

61.
Jensen, p. 49.

which were often in the same area as lower-class bye-law terraced houses, whereas the middle and upper-middle class preferred to live in outer suburbs surrounded by the countryside.

Attempts to improve housing standards included design competitions, with winning entries frequently model designs for semi-detached houses that were published in journals such as *The Builder*.⁶² For the readers of *The Builder*, including speculative builders or developers, the task was often to fit a maximum number of suburban cottages into a site, while balancing this with the need to make them desirable, affordable, and marketable. But at the end of World War I and following the introduction of new housing legislation, Victorian terraced houses became associated with overcrowding.

The *Tudor Walters Report* (1918) greatly influenced the new type of housing that would be built, with its discussion focused on semi-detached and short terraced houses, usually with four to six houses forming the side of an urban block with gardens to the front and back.⁶³ In addition, the majority of the standard plans in the *Manual on the Preparation of State-aided Housing Schemes* (1919) were for semi-detached houses. The layout of the speculative semi-detached houses suggested by the report and manual, was adopted by most built in this period (Fig. 25). The sitting room was to the front and could open up to a living room in the back through folding doors, the kitchen was to the rear, and stairs placed either side of a shared party wall aligned with the entrance. Some variations in larger houses included an integrated garage and space for a fourth bedroom on the first floor. The hall continued to be an important part of the house. But in smaller and cheaper houses, it became a mere lobby. Particularly, council houses reduced spaces for the hall and circulation, with interwar examples having the front door opening onto a small lobby from which the stair rose, and with access to the back of the house through the main living room.

However, in addition to its overall dimensions, generally houses after 1914 gained in internal usable floor area from the reduction and eventual elimination of flues. Similar to the transformation of the interwar terraced house, the semi-detached house reduced the rear extension while increasing its frontage to allow better natural lighting. Its basic plan had generous front and back rooms, with a narrow 'kitchenette' matching the width of the entrance hall. In this layout, entrance doors were placed in the centre, giving the illusion of the pair of semi-detached dwellings being one large house. This layout also minimised noise between the main living rooms and bedrooms placed next to the party wall. The plan further permitted an efficient central location of all plumbing.

62.
Pamela Lofthouse, 'The Development of the English Semi-detached House: 1750-1950', (unpublished master thesis, University of York, 2012), p. 44.

63.
Jensen, p. 146.

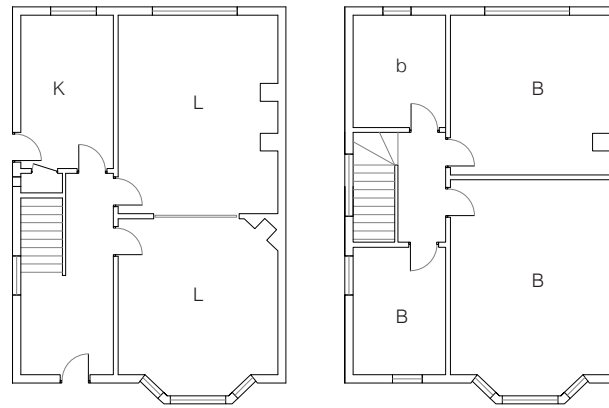
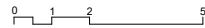


Fig.25
Ground and First Floor Plan
Universal Semi Design
Finn Jensen, *The English Semi-Detached House*, 2007



Another common layout, greatly favoured by owners, placed the entrance doors at the furthest corners of the house, thus maintaining a greater sense of privacy and separation from neighbours. New layouts became popular in the post-war period with the *Housing Manual* of 1949 that provided both rural and urban plans for semi-detached houses. Rural layouts combined the kitchen, living, and dining room but retained a separate sitting room, while the urban ones had a working kitchen and separate dining and living rooms (Fig. 26).

Given the post-war housing policies and subsidies, the speculative development of semi-detached estates saw its greatest rise in the interwar period. This was also enabled by an expansion of tramways, railways, and the underground for middle-class workers, who could now easily and cheaply commute into London. A notable example is the London suburb of Edgware, served by a branch of the Great Northern Railway and, from 1924, by the London Underground and its extended Northern Line. Private sector semi-detached houses offered bay windows and picturesque decoration, whereas semi-detached council housing was built with minimum decoration and medium pitched roofs in a simple neo-Georgian style. As Frank Brown points out, functional demands seemed 'to have taken second place to the question of symbolism and external expression'.⁶⁴ Yet in terms of their urban and dwelling layout, privately and council built semi-detached houses were very similar, and the cul-de-sac and the close became a shared planning feature of that period.

64. Frank E Brown, 'Analysing Small Building Plans: A Morphological Approach', in *The Social Archaeology of Houses*, ed. by Ross Samson (Edinburgh: Edinburgh University Press, 1990), p. 274.

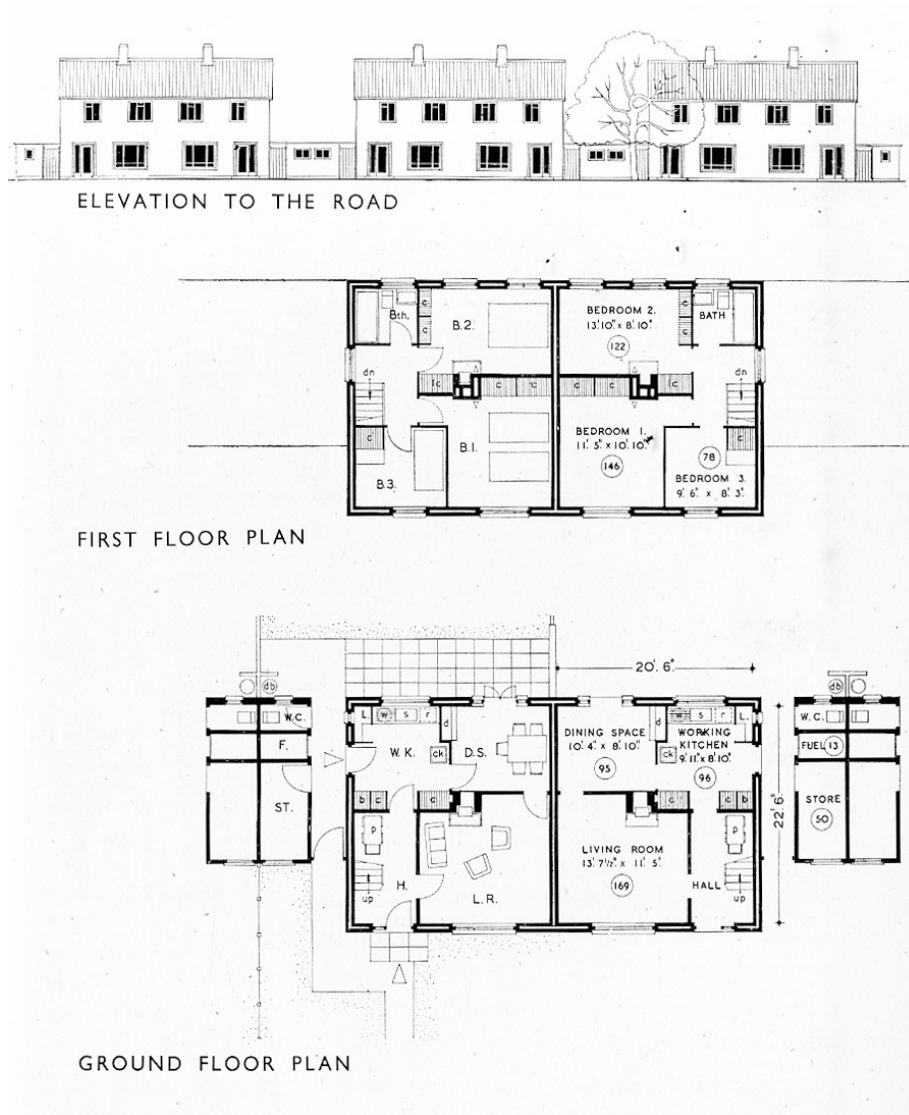


Fig.26
Ground and First Floor Plan
Urban Semi-Detached House
Ministry of Health and Works, Housing Manual, 1949

Maisonettes

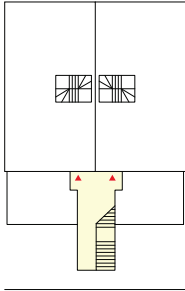
Two-Storey Dwellings

65.
Glendining and Muthesius, p. 27.

The maisonette is typically found in a block of flats, with each maisonette consisting of two floors and an internal staircase usually leading to bedrooms on the upper level. The nineteenth-century cottage flat is often seen as the precursor of the maisonette, however, cottage flats are 'not flats looking like cottages, but cottages looking like flats'.⁶⁵ Thus, maisonettes are rather like stacked two-storey houses. Maisonettes were particularly important in post-war mixed developments, providing common ground between flats and houses. They proved successful due to the many economic and structural benefits they offered, such as the elimination of a lift and the use of a cross-wall construction (party wall). These benefits did not necessarily supersede those of the flat – since flats do not require an internal staircase and additional circulation space – but the main argument in support of maisonettes was their familiarity and similarity to houses.

Although maisonettes have a very similar internal layout to that of a two-storey house, their external access and circulation have more in common with blocks of single-storey flats. Maisonettes are normally grouped and accessed directly in pairs (staircase access), via an exterior access gallery, and through internal access corridors (scissor or crossover maisonettes). Paired direct access tends to occur in three- to five-storey buildings where a single staircase is sufficient and no lift is required. Most maisonettes are accessed on the lower floor level, however, depending on the building's circulation and the position of a lift or alternating interior and exterior corridors, they can also be accessed from the upper floor.

Direct Access in Pairs

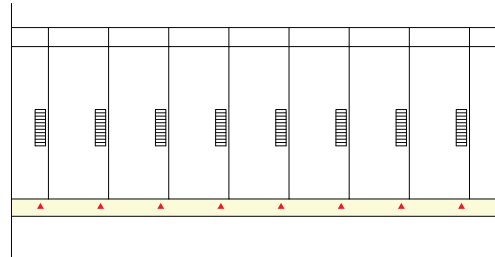


Maisonettes, Alexandra Road Estate, 1972-78

While predominantly a post-war dwelling typology common to slab blocks, the maisonette, as a two-storey flat was also used in some mansion blocks. Albert Hall Mansions (1876–1886), for example, consists of three blocks of five- to seven-storeys with two- and three-storey maisonettes. Each block has two entrances, one leading to an inner courtyard with a central stairwell and another to a service staircase. Its eight apartments are set around these stairwells in pairs, with each maisonette consisting of two ‘wings’, one two-storey wing with service quarters on the lower and bedrooms on the upper level, and another wing containing the living room and dining room. The exact layout of these rooms in relation to one another varies due to split-level maisonettes alternating with single-storey flats on a floor above or below.

With much post-war construction focused on building new flats, this also included high-density and low-rise blocks of maisonettes. Following the creation of London’s boroughs in 1965, councils such as Camden were granted greater planning and building powers. This led to new housing developments such as the Alexandra Road Estate (1972–78) by Neave Brown, which offers one- to three-storey flats and maisonettes. The scheme was composed of three continuous blocks placed parallel to each other, a block of row houses and two stepped blocks of maisonettes and flats separated by a central walkway. The stepped blocks allow each maisonette to have an open-sky terrace to the front, with entrances to the maisonettes accessed in pairs via an uncovered stairway at street level. The use of direct access via a staircase is unusual, as most post-war maisonettes, regardless of block height, used gallery access.

Exterior Access Gallery



Maisonettes, Alton West, 1959

During the interwar period, LCC architects and local authorities experimented with four- to six-storey tall buildings of flats and maisonettes with balcony access. The previous LCC tenements had enclosed staircases with two to three flats per landing, which was now thought to be poorly ventilated. Geoffrey House (1920–22) on the Tabard Gardens Estate, designed by Topham Forrest, has external access galleries with an experimental electric lift and new dust ‘shoots’.⁶⁶ The two uppermost floors are maisonettes, all with scullery-kitchens, bathrooms, and separate toilets.

66. Simon Pepper and Peter Richmond, ‘Upward or Outward? Politics, Planning and Council Flats (1919–1939)’, *The Journal of Architecture*, 13.1 (2008): p. 66.

To avoid the need for costly lifts, a requirement set out by the *Dudley Report* (1944) for buildings with dwelling access levels above four storeys, mid-rise three- and five-storey buildings with maisonettes placed above garages or ground-floor flats became popular in post-war developments. Maisonettes could be accessed through galleries on the first and third level and, in a four-storey building, two maisonettes could be stacked on top of each other, with the first accessed on the ground floor directly via separate entrances (Fig.). Among the first projects to introduce a four-storey maisonette was Hawthorne House (1946–62) at Churchill Gardens in Pimlico by Powell & Moya, with the scheme including blocks of single-storey flats and nine- and eleven-storey slab blocks accommodating a mix of maisonettes and flats (Fig. 28).

During the boom of high-rises starting in the 1950s, many maisonettes were built alongside regular flats. But little was written about maisonettes, even though the dwelling typology was familiar through Le Corbusier’s well-published ‘immeuble-villas’. In 1953, a group of architects from the

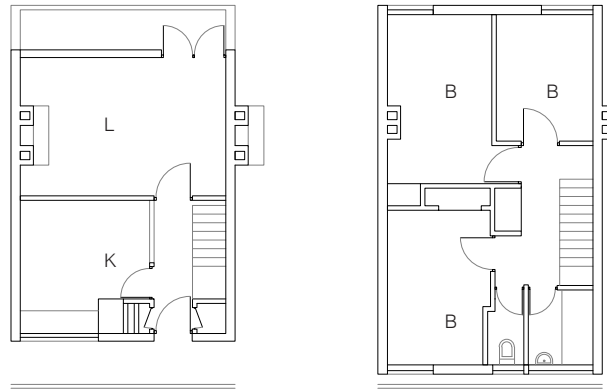


Fig.27
Ground Floor and First Floor Plans
3 Bedroom Maisonette, Canada Estate, Bermondsey, 1962
Colin Lucas, LCC Architects Department

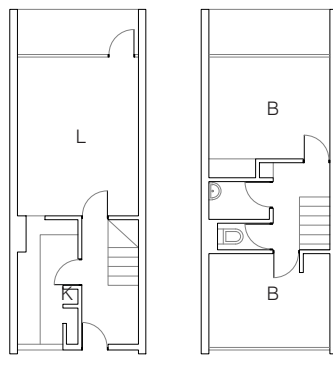
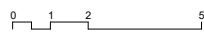


Fig.28
Ground Floor and First Floor Plan
2 Bedroom Maisonette, Churchill Gardens, 1962
Powell & Moya



67.

This group included Leslie Martin, Colin St John Wilson, Peter Carter and Alan Colquhoun.

Housing Division in the LCC designed a prototype for stacked houses.⁶⁷ Their narrow-fronted two-storey maisonette slab block combined the benefits of a traditional house with the need for greater density (Fig. 29). It was 3.35 m wide and 9.45 m deep, and had a double frontage and primarily suitable for use in high-rise slab blocks. Its lower floor had a kitchen and living room and the upper floor bedrooms, one each to the front and back with a bathroom in between. The access gallery leading to each maisonette was located on alternating floors, maximising privacy for the living room – normally located opposite the access gallery – and bedrooms on the upper level. While older building methods covered frame constructions with brick or plaster, the slab block maisonette's new box-frame structure revealed the actual physical limit of each dwelling with protruding floor slabs emphasising the horizontal plane.

68.

Completed a year after Alton East. See Ian Colquhoun, *RIBA Book of British Housing: 1900 to the Present Day* (London: Architectural Press, 2008), p. 12.

Inspired by Le Corbusier's influential Unité d'Habitation in Marseilles, Alton West (1959) by the LCC consists of twelve-storey, eleven-storey, and four-storey slab blocks, with the last two made up of maisonettes (Figs.).⁶⁸ Brickwork is used throughout the estate, however, concrete dominates visually as a building material. Alton West's buildings simplified the Unité's intricate interlocking section to a stack of identical maisonettes, and its internal access corridor was replaced by the more common English open access gallery. The slab block proved to be short-lived in London, however, due to its higher cost, brutalist aesthetic, and issues with overshadowing. Despite the tower block typology providing smaller dwellings than slab blocks, it would become more popular.⁶⁹ While external corridors in maisonettes offered privacy to living rooms and bedrooms, there was a trade-off with increased noise from the external walkways affecting habitable rooms, particularly bedrooms.

69.

Glendining and Muthesius, p. 58.

There were other experiments with building typologies to resolve some of these issues. One such project is Keeling House (1954–59) by Denys Lasdun, representing an alternative to the slab block (Fig. 30). The housing block is arranged in a butterfly-shaped plan, with four external access bridges leading to maisonettes that stem out from the central vertical circulation. Each bridge connects to a cluster of paired maisonettes. The distance between the clusters is roughly the width of a terraced housing street, giving a similar degree of privacy and contact between neighbours. In Robinhood Gardens (1968–1972), Alison and Peter Smithson explored the idea of the 'street in the sky', consisting of wide access galleries that could be used as common areas meant to encourage neighbourly contact between residents. Although the initial deck was reduced in size due to cost, the doors to the maisonettes were placed perpendicular to the deck to create small nooks for plants and

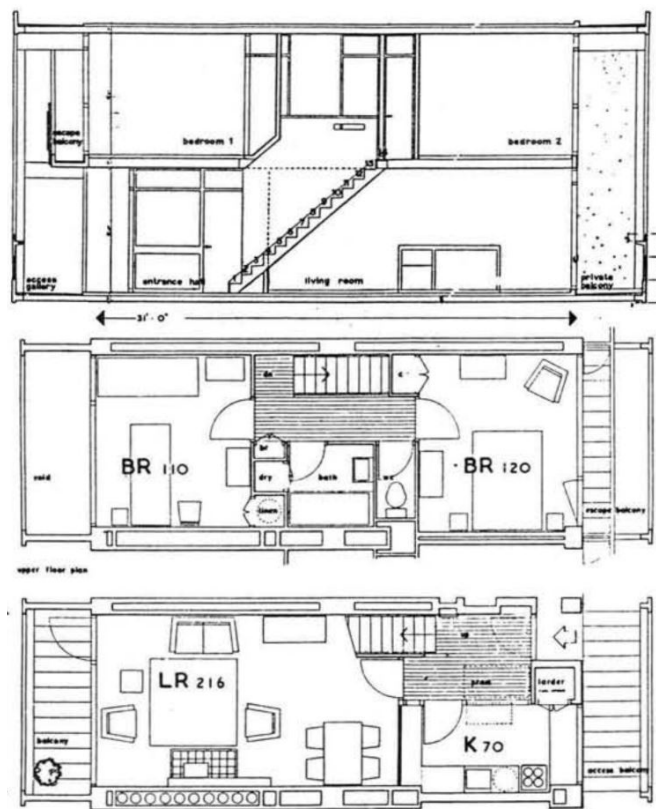
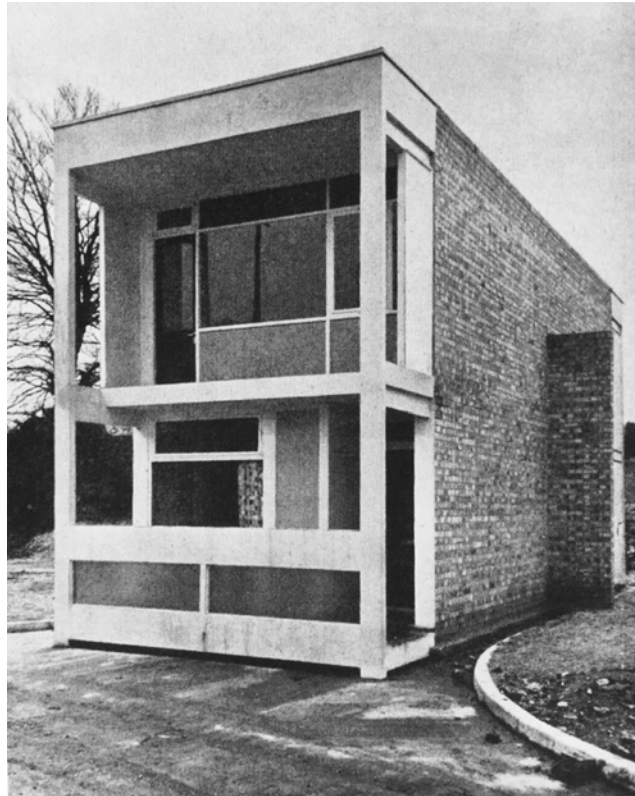


Fig.29
 Photograph of Exterior, Section, and Floor Plans
 2 Bedroom Maisonette Prototype, London County Council, 1953

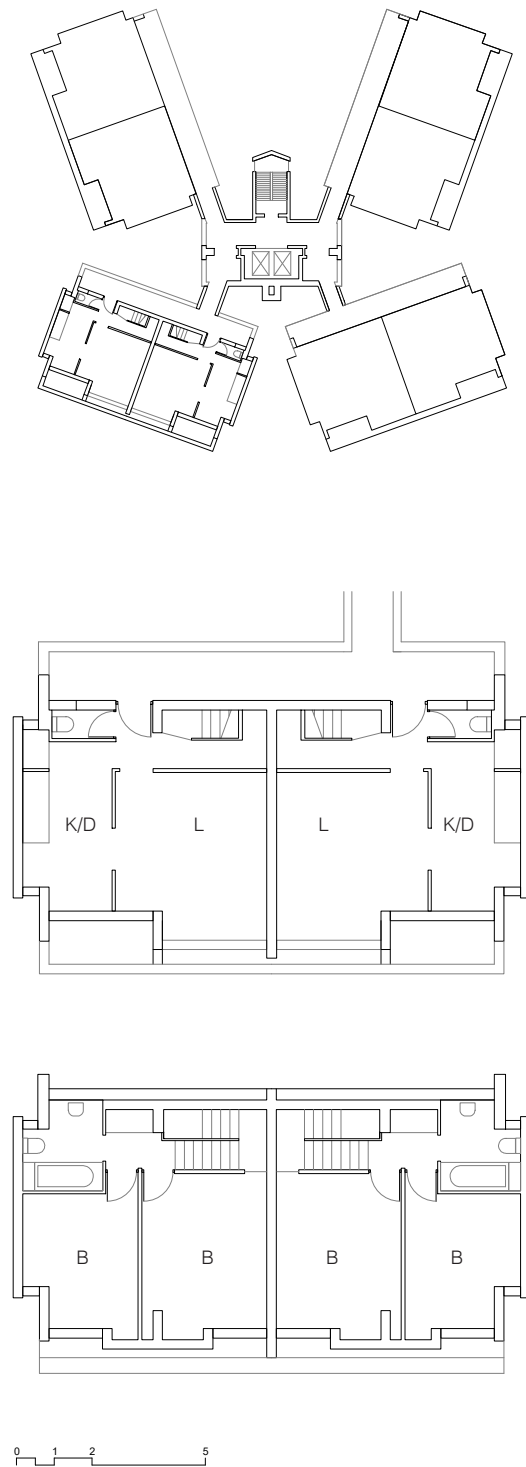


Fig.30
 Building Layout (1:400) and Floor Plans: Entrance Level and First Level
 2 Bedroom Maisonettes, Keeling House, 1958
 Denys Lasdun

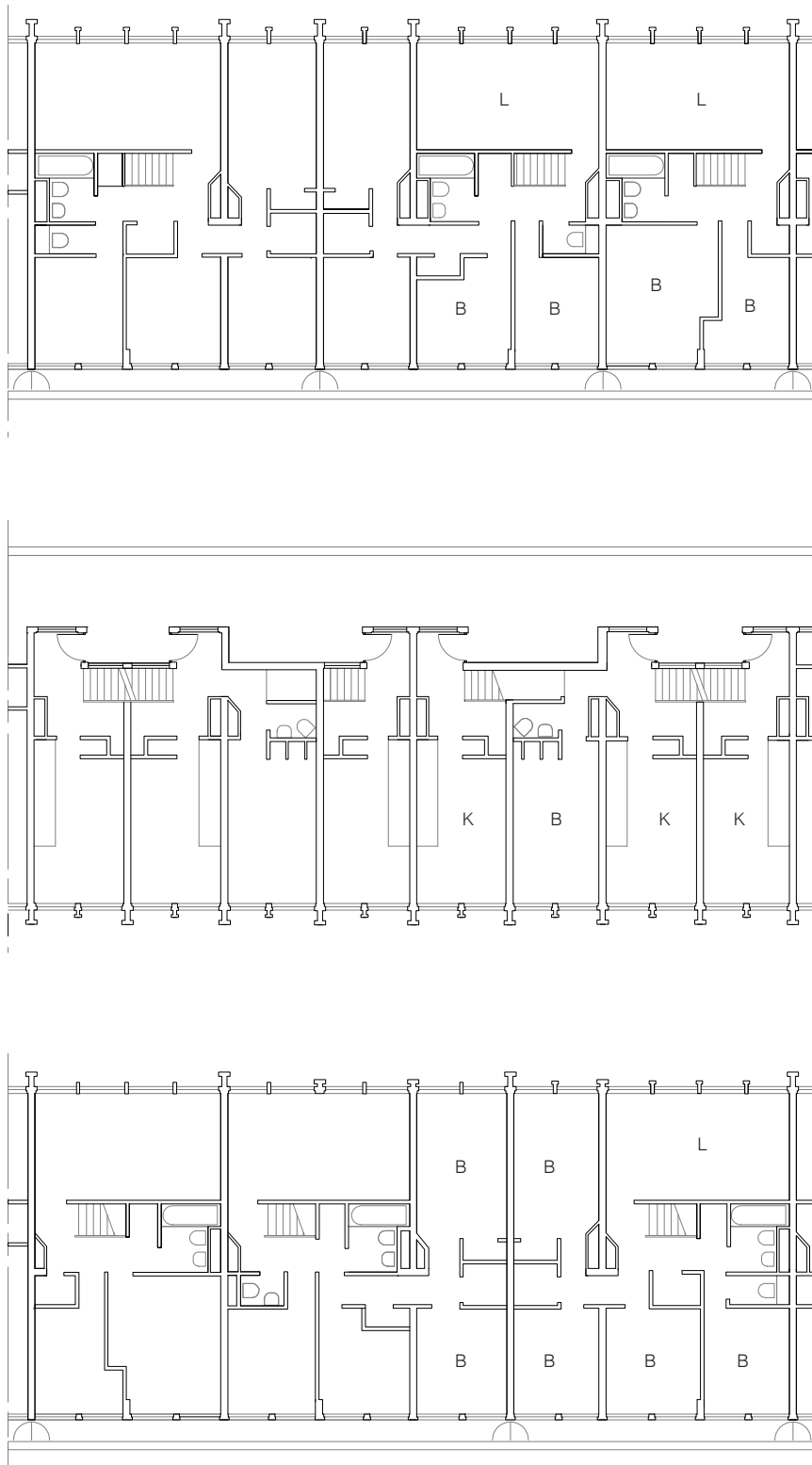


Fig.31
Lower, Deck (Entrance Level), and Upper Level Floor Plans
Maisonettes, Robin Hood Gardens, 1972
Alison and Peter Smithson



Fig.32
Photograph of 'Platform Housing'
Thamesmead, 1968
Greater London Council

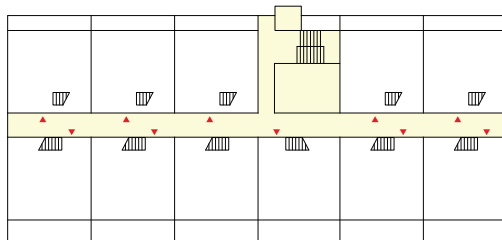
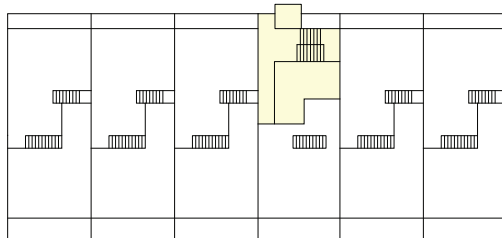
more private interactions. The gallery levels, facing the 'street side' of the slab blocks, gave access to both an upper and lower maisonette. By having the access galleries every three storeys rather than on every other, noise was avoided in the bedrooms, which were placed on the opposite side of the access gallery facing the central open areas between the two slab blocks (Fig. 31).

This idea of 'streets in the sky' would be explored at different scales through the 'street deck', a wider and much longer gallery or platform linking several buildings. External walkways arose in large mixed housing developments such as Thamesmead (1968) built by the GLC (Fig. 32). This 'platform housing' permits residents to walk between houses and blocks of flats above the ground, with Thamesmead having a network of walkways on the first floor connecting 'neighbourhoods' and shared services in the estate.⁷⁰ Despite the success of internal walkways in smaller low-rise projects, their inclusion at Thamesmead separated pedestrians from the street, resulting in a lack of public life at both levels.⁷¹

70.
Ibid, p. 146.

71.
Colquhoun, p. 76.

Internal Access Corridor



Maisonettes, Tidey Street, Lincoln Estate, 1962

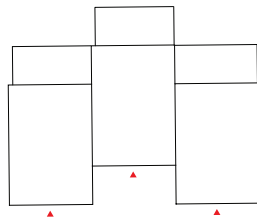
Adopted in the early 1960s by a team in the LCC Architects Department, the 'scissor' type or crossover maisonette uses interior access corridors. Similar to Le Corbusier's Unité in Marseilles, the internal double-loaded corridors serve two parallel rows of interlocking maisonettes. A corridor every third level with accompanying lifts gives access to flats on the floors above and below. These types of housing blocks provided more flexibility and better orientation than existing LCC dwelling typologies, especially by placing all living rooms to one side of the building and bedrooms to the other and using a central corridor instead of an access deck. Kelson House (1965–67) by Gordon Tait on the Samuda Estate is an example of a crossover maisonette. A 25-storey tower block, each maisonette is accessed either up or down from half a flight of stairs connected to an access corridor. The lifts and stairs are located in a separate tower connected to the main building by bridges that lead to interiorised access corridors. Another example is a 19-storey housing block in Tidey Street (1962) on the Lincoln Estate in Poplar designed by the LCC Architects Department, which has short internal corridors and lift landings on alternating floors.

Single-Storey Dwellings

A single-storey dwelling has all rooms arranged on one floor. This encompasses low-density housing such as freestanding bungalows, cottage flats (typically designed as pairs on top of each other), and regular flats in more high-density solutions including low- to mid-rise slab and high-rise tower blocks. Depending on larger urban design approaches, each has a particular relation to the street and urban fabric, with single-storey dwellings employing a diverse range of access types at the building level.

Bungalows

Single-Storey Dwellings



Alton West, Roehampton, 1959

The bungalow is a single-storey and detached building, usually with one to three bedrooms. Bungalows represent a mere 1.7% of London's inner-city housing stock (2.7% in outer London boroughs), the majority of which (52%) have two bedrooms and almost a third (28%) having three bedrooms.⁷² This typology was originally imported by a British middle class who had become familiar with it in India, and was first introduced in England in seaside resorts during the mid-Victorian era.⁷³ During the interwar period, however, it spread inland to London's suburbs to house a lower-middle class.

In the post-war period, the bungalow was employed by the Burt Committee (Interdepartmental Committee on House Construction) as a short-term emergency response to London's housing crisis. Formed in 1942 by the wartime coalition government, the Burt Committee was to deal with war damage to the city's built environment and complete the pre-war slum clearance project.⁷⁴ Taking inspiration from the USA's long tradition of prefabricated houses for workers and their families, the committee developed a temporary steel bungalow prototype known as the 'Portal Bungalow' – taking its name from the then Minister of Works, Lord Portal. The Portal Bungalow had a rectangular floor plan and accommodated two bedrooms, a fitted kitchen, a bathroom, and a living room, with the kitchen and bathroom modules efficiently designed to share plumbing.

72. Valuation Office Agency, 'Dwellings by Property Build'.

73. Bungalow originates from the Hindi word *banglā* literally meaning 'belonging to Bengal'.

74. 'A Short History of Prefabs - Building the Post-war World', Content, Prefab Museum <<https://www.prefabmuseum.uk/wp-content/uploads/2016/06/Building-the-post-war-world.pdf>> [accessed 24 June 2020].

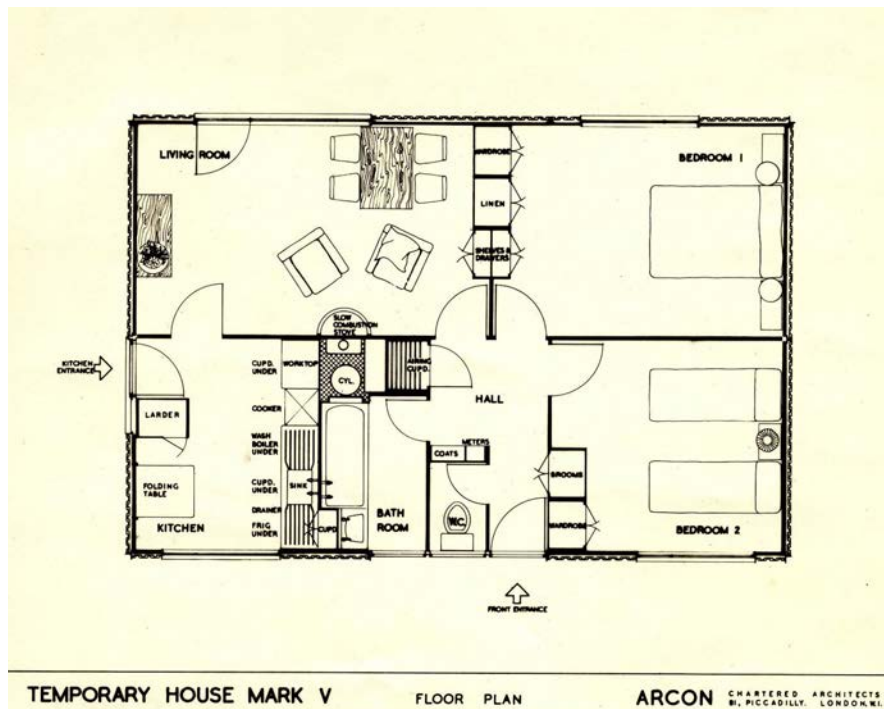


Fig.33
Floor Plan of the Arcon MkV Bungalow, 1944
Arcon (Architectural Consultants)

The Portal Bungalow as a prototype provided a generic design template for manufacturers to develop their own design variations such as those now known as Tarran, Acron, and Uni-Seco models (Fig. 33). All approved prefabricated bungalows used modules no more than 2.3 m wide to allow for transportation by road and had a minimum internal floor area of 59 m² once assembled. Despite initial hesitation about prefabrication and complaints about thin walls and condensation problems, they came to be celebrated by inhabitants and professionals alike as a modern housing solution, with prefabricated housing exhibited at the Tate Gallery. The prefabricated bungalow not only represented a modernist architectural ideal – a building produced by a factory line – but also offered families in shared accommodation in London the affordable option to live in a detached house with their own indoor bathroom, kitchen, and garden. The provision of built-in furnishings gave further savings and included some of the most up-to-date fittings uncommon in the older housing stock.⁷⁵

The prefabricated units required no foundations, making them quick to install. But preparing brownfield sites for their erection proved difficult, as new neighbourhood scale planning approaches were needed to take into account the site conditions and construction method. Subsequently, three ‘urban’ layouts were developed, staggered rows of bungalows set back from the main roads and connected by smaller footpaths, bungalows arranged around a central communal green space with inner units recessed, and a more gridded plan.

75.
Janet Shepherd, *The 1950's Home*
(Stroud: Amberley Publishing, 2017),
p. 48.



Fig.34
Neighbourhood Plan of Excalibur Estate, 1945
Ministry of Works

76.
Brenda Vale, *Prefabs: The History of the UK Temporary Housing Programme* (Abingdon, Oxon : Taylor and Francis, 2003), p. 1.

77.
Peter Guillery, 'Historical Overview', in *Mobilising Housing Histories: Learning from London's Past*, ed. by Peter Guillery and David Kroll (London: RIBA Publishing, 2017), p. 13.

78.
'Mapping Post-war Prefabs Part 2 - Industrial London', Content, Prefab Museum <https://www.prefabmuseum.uk/content/history/mapping-post-war-prefabs_industrial_london> [accessed 24 June 2020].

79.
Elisabeth Blanchett, *Prefab Homes* (London: Shire Publications, 2014), p. 23.

Under the Temporary Housing Programme of 1944, 156,623 bungalows were built for rent, each with a design life of 10–15 years, although many have lasted longer.⁷⁶ Largely demolished in 2015, with only six prefabricated bungalows retained and listed, London's Excalibur Estate (1945–46) in Catford by the Ministry of Works is exemplary for the unprecedented scale and longevity of the bungalow settlements (Fig. 34).⁷⁷ Considered Britain's largest and oldest prefabricated bungalow developments, Excalibur Estate consisted of 187 Uni-Seco units arranged in a grid.⁷⁸ The Uni-Seco model could be assembled in different combinations to suit various locations and avoid repetitive appearance, with Excalibur Estate using two main variations. One with a central entrance that allowed all rooms within a home to be accessed from the main entrance hall, and one accessed via a corner entrance that saw a more open-plan layout between kitchen, living, and dining areas.⁷⁹ The detached bungalows were further separated from each other by small gardens that surrounded the perimeter of each unit within the gridded neighbourhood layout. The gardens permitted residents to grow their own produce during a time of rationing and formed a buffer space restricting direct access from the street and giving privacy.

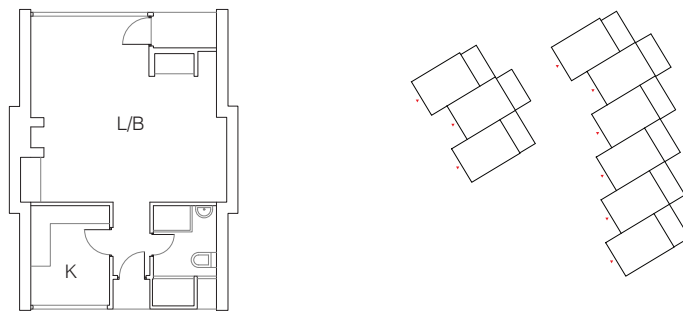
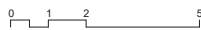


Fig.35
Floor Plan and Urban Layout (1:1000)
1 Bedroom Bungalow, Alton West, 1959
London County Council



But considered inefficient in their land use, density, and durability, the prefabricated bungalow never succeeded in establishing itself as a feasible long-term housing solution in London. Moreover, the rising cost of timber, steel, and aluminium in the post-war period made the construction of prefabricated bungalows more expensive than that of traditionally built houses.⁸⁰ While originally designed for young families, the fact that they were easily accessible and exclusively on one floor made them particularly attractive to older residents. This take-up by an older demographic was also stimulated by a special subsidy for one-bedroom dwellings by local councils in 1946, which encouraged the building of bungalows or small flats for the elderly (Fig. 35). Today, the bungalow has seen a revival as an affordable option for older people downsizing from a family house outside London.

80.
Prefab Museum, 'A Short History of
Prefabs.'

Flats

Single-Storey Dwellings

The term 'flat' derives from 'flat' or 'flett' in fifteenth-century Scotland, referring to the interior accommodation of a house. In the eighteenth-century, the term *flat* came to mean a particular floor or storey within the house.⁸¹ While the Scottish had long referred to apartments as rooms within a multi-dwelling building, the English used the word flat to allude to a single-storey layout. In London, flats were first introduced in the mid-nineteenth-century as both upper- and lower-market dwellings. Among the first blocks of flats in London was York House (The Albany) in Piccadilly, built between 1771 and 1776 by William Chambers, and converted and extended to form 69 bachelor apartments in 1802 by Henry Holland.⁸²

During the nineteenth-century, flats were built almost exclusively for low-income groups, thereby acquiring a negative association.⁸³ In the Victorian period, however, a distinction was made between working-class flats, coined as tenements or cottage 'flats', and 'apartments' for the middle and upper classes. The flat became defined as a 'dwelling whose habitable areas occupy one floor, or part of one floor, in a building containing two or more floors'.⁸⁴ While this definition excludes dwellings with two floors such as the 'maisonette', which is often grouped with the flat and used in similar housing contexts, it does account for flats deriving from the conversion of buildings. In 1908, the Board of Trade identified two main flat types, large dwellings which had been subdivided into smaller units and purpose-built flats in a multi-storey building block provided by an institutional landlord such as a model company, a charitable housing association, or the LCC.⁸⁵

Historically, the flat developed with a necessity to house a large number of people on small but expensive plots of land and, rather than presenting itself as a new and better type of home, it adopted internal layouts already familiar from houses. Flats were thus often designed at the beginning like

81. Anthony Sutcliffe, 'Introduction', in *Multi-storey Living: The British Working-class Experience*, ed. by Anthony Sutcliffe (London: Croom Helm, 1974), p. 1.

82. 'Albany', in *Survey of London: Volumes 31 and 32, St James Westminster, Part 2*, ed. by F H W Sheppard (London: London County Council, 1963), p. 367.

83. Glendinning and Muthesius, p. 5.

84. Ibid, p. 2.

85. Barry Goodchild, *Homes, Cities and Neighbourhoods: Planning and the Residential Landscapes of Modern Britain* (London: Routledge, 2016), p. 33.

‘stacked’ bungalows. A flat could be designed to mirror directly or indirectly the benefits of houses by providing a front entrance, garden, or patio as well balconies, extra living spaces, a utility room, secure storage, and good sound insulation. What ultimately defined the nature of the flat, however, were design innovations related to the access and circulation within blocks of flats. This played a key role in mixed housing developments during the post-war reconstruction efforts. The negative image of flats was lessened by their potential to provide much-needed shared and public amenities and infrastructure that were difficult to include in developments with other building typologies. A more unique example of this is the Barbican Estate in the City of London, which incorporates the London Museum, a public day school, church, and theatre. Another is Trellick Tower (1972) by Erno Goldfinger on the Cheltenham Estate in Kensal Town with its shops, offices, youth and women’s centres, and a nursery.

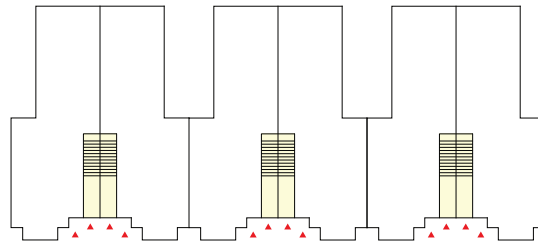
The *Housing Design Handbook* (2019) categorises the critical design issues of flats according to three considerations, the quality of internal planning and layout, a sharing of circulation spaces, and building aspect and orientation.⁸⁶ These categories are highly dependent on access types used in a building. Among the disadvantages of a flat, which is sometimes considered an advantage, are shared maintenance, lobbies, common areas, corridors, lifts, and stairs, which are essential elements of the safety and escape design of housing. Moreover, contrary to the belief that the height of a block of flats has the greatest impact on the lives of inhabitants, as Miles Glendinning claims, the arrangement of access and circulation within the block of flats is more significant as it determines accessibility, orientation, unit types, and room layouts.⁸⁷ In fact, just 14% of homes built in London in 2011 were in buildings with five or more floors.⁸⁸ Working-class housing in the suburbs was largely uniform in layout, with the main exception of cottage flats.

86.
Levitt and McCafferty, p. 71.

87.
Glendinning and Muthesius, p. 80.

88.
James Gleeson, *Housing in London 2015: The Evidence Base for the Mayor’s Housing Strategy* (London: Greater London Authority, 2015), p. 24.

Direct from Exterior



Cottage Flats, North Bank Road, 1905

The development of cottage flats in London began simultaneously with the building of model dwellings for the lower classes that used both cottage flats and tenements.⁸⁹ Cottage flats, a dwelling typology more commonly found in northern England, were built for workers who could not afford the higher rents of traditional family dwellings but desired to live in a house rather than tenement. Cottage flats, sometimes referred to as maisonettes, were at the time of their conception also called tenement flats or 'half houses' (Fig.).⁹⁰ The overall building appearance of cottage flats is very similar to that of a two-storey suburban cottage or terraced house, but each cottage flat has its own ground floor street access with entrances of the adjoining flat above or below paired.

The first cottage flats in London are Albert Street in Spitalfields (1858) and Victoria Cottages (1864), likely to be designed by Henry Roberts for the Metropolitan Association for Improving the Dwellings of the Industrious Classes.⁹¹ They were arranged in parallel rows of two-storey buildings. Albert Street's 33 flats had two bedrooms each, a parlour, living room, and scullery, with their uniform appearance resembling that of terraced houses (Fig. 36). As model dwellings, Albert Street was however criticised for its low density.⁹²

At the time, many two-storey houses were already shared by at least two families, each occupying a floor or, in more extreme cases, a room.⁹³ Other than overcrowding, there were several problems with sharing a non-purpose-built house. For example, piped water and a 'copper' water heater were only available in the ground floor scullery, meaning upper-floor tenants had to carry their water up the stairs.⁹⁴ The questions of how to convert the London terraced house into flats emerged around the same time as model dwellings and high-rise tenement blocks. For example, in *Model Houses for the Working Classes* of 1871, Banister Fletcher proposes a design to convert houses into modern single-storey flats (Fig. 37).

89. Glendinning and Muthesius, p. 2.

90. Colin Thom, 'Chapter Two: 'Miles of Silly Little Dirty Houses': Lessons of Victorian Battersea', in *Mobilising Housing Histories: Learning from London's Past for a Sustainable Future*, ed. Peter Guillery and David Kroll (London: RIBA Publishing, 2017), p. 41.

91. John Nelson Tarn, *Five Per Cent Philanthropy: An Account of Housing in Urban Areas Between 1840 and 1914* (Cambridge: Cambridge University Press, 1973), p. 27. Although the architect is unknown, the principal architect for the Metropolitan Association was Henry Roberts, responsible for the design of many subsequent model dwellings.

92. 'Mile End New Town', in *Survey of London: Volume 27, Spitalfields and Mile End New Town*, ed. by F H W Sheppard (London: London County Council, 1957), p. 265.

93. Thom, p. 40.

94. A copper is a metal tub set into a brick housing with a small fire grate underneath used to heat water for bathing or laundry. In many cases the tub was actually made of cast iron.



Fig.36
 Photograph of 11-14 Albert Cottages, 1857
 Metropolitan Association for Improving the Dwellings of the Industrious Classes.

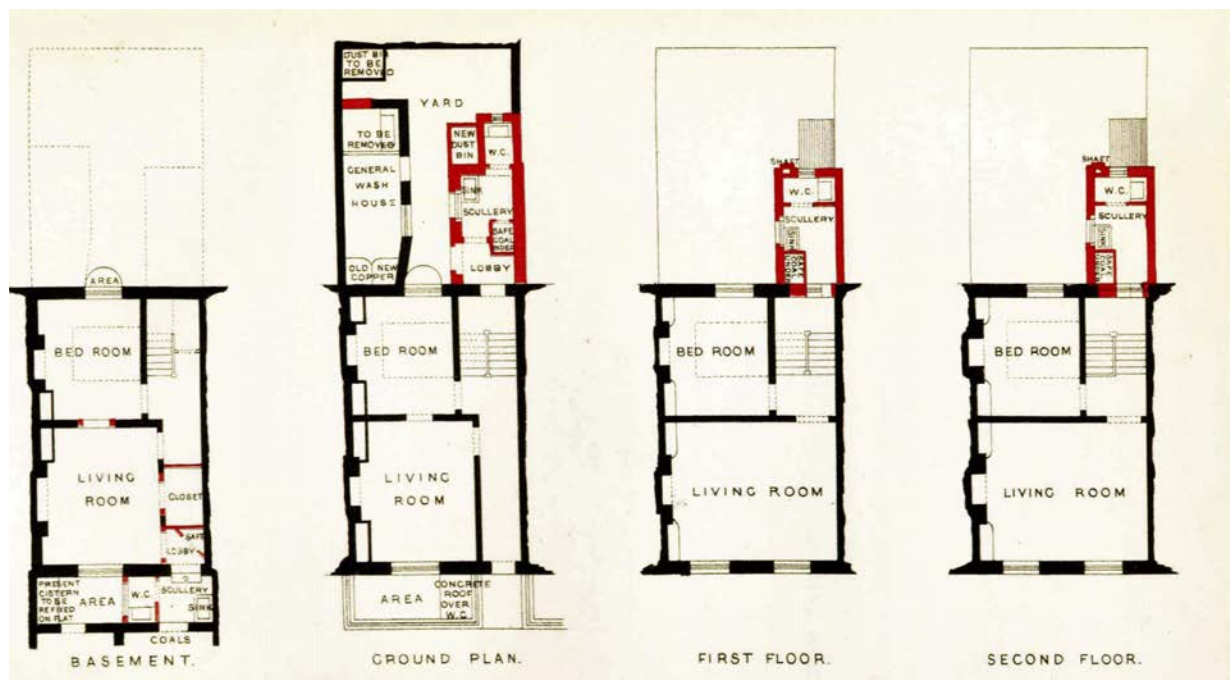


Fig.37
 Model Plans for Adaptation of Existing Dwelling Houses for Letting in Flats
 Banister Fletcher, Model Houses for the Industrial Classes, 1871

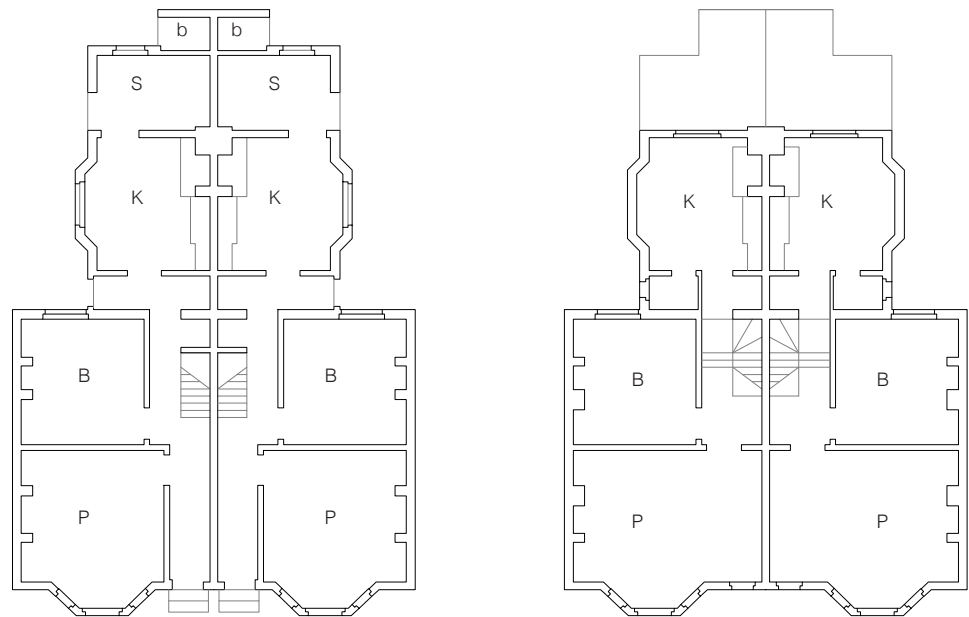


Fig.38
Ground and First Floor Plans
Cottage Flats in Park Town, Battersea, 1884
JS Cooper

By the 1880s, builders began to offer shared ground floor sculleries or two-storey rear extensions with a room for a kitchen and bathroom or scullery on both floors, such as in Park Town in Battersea (Fig. 38). According to Charles Booth, they were at the time the most fashionable type of accommodation for young working families in London.⁹⁵ He considered purpose-built cottage flats a great housing alternative, as they could serve one or two families, depending on the kitchen and scullery arrangement.⁹⁶ Although each family occupied their own floor, the first cottage flats shared an entrance and an internal corridor leading to the stairs of the upper dwelling. But subsequent purpose-built solutions provided each flat with their independent entrance, with four doors placed next to each other at street level (Fig. 39).

The London County Council would further explore this housing typology in large cottage estates in Tooting, Tottenham, and Hammersmith. In the first cottage estate, Totterdown Fields (1901–1911) by the LCC Architects Department in Tooting, 1,229 cottages were designed according to four classes, varying from first class two-storey cottages with five rooms to fourth class cottages, consisting of a separate ground floor and first floor flat, each with three rooms (Fig. 40).⁹⁷

95.
Goodchild, p. 31.

96.
Thom, p. 41.

97.
Wandsworth Conservation &
Design Group, *Totterdown Fields
Conservation Area Appraisal &
Management Strategy* (London:
Wandsworth Council, 2008), p. 9.

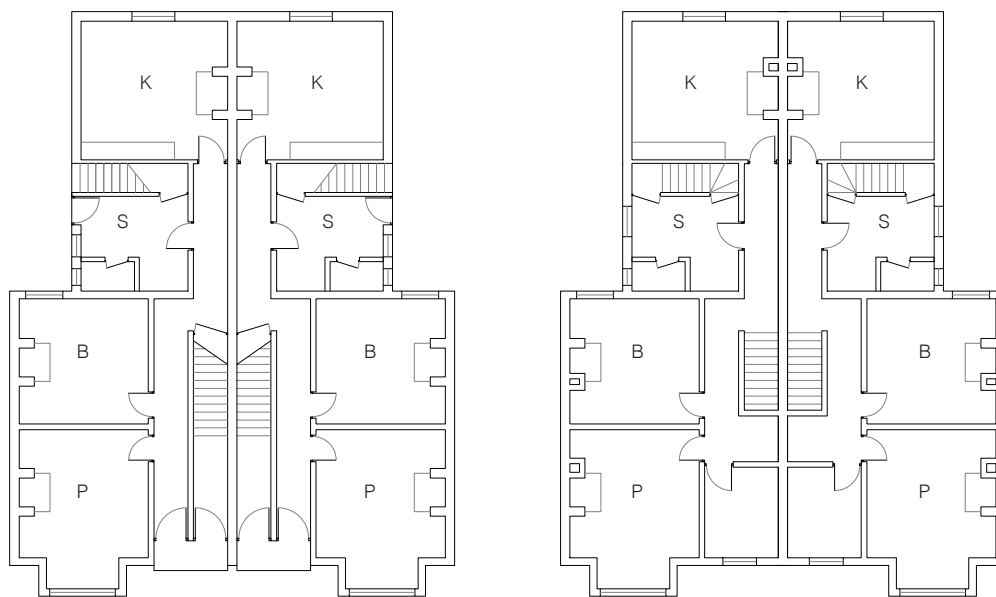
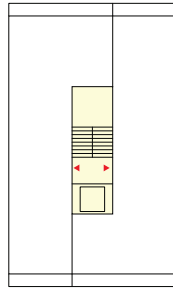


Fig.39
Ground and First Floor Plan
Cottage Flats, North Bank Road, Walthamstow, 1905
Hartshorne Brothers Builders



Fig.40
Photograph of Exterior
Warner Estate, Waltham, 1900
Thomas Warner, Courtenay Building Ltd.

Direct from Interior



Barbican Estate, 1962

Model Dwellings and Tenement Blocks

98.

In 2015, a build-to-rent model's return rate was 7.5% per annum compared to a traditional build-to-sell model at 17.5%. Investors and developers typically require a return between 10% and 12.5%. See, Investment Property Forum, *Mind the Viability Gap: Achieving More Large-scale, Build-to-rent Housing* (London: Investment Property Forum, 2015), p. 6.

99.

A tenement is a building shared by multiple dwellings, typically with flats on each floor and with a shared access staircase.

100.

Robin Evans, *Translations from Drawing to Building and Other Essays* (London: Architectural Association, 2011), p. 108.

101.

'Tenemental' or stair access type is used by Glendinning to reference the direct access in pairs found in tenement blocks.

Starting in the 1830s, a group of philanthropic organisations campaigned for the improvement of housing for the labouring classes and began to build so-called 'model dwellings'. Despite being philanthropic, they still expected to receive around 5% return on their investment.⁹⁸ These model dwellings used cottage flats, cottages, and tenement blocks alike, specifically those that included both family homes and lodgings for single people.⁹⁹ While flats were not common in London, tenement buildings were inspired by Henry Robert's designs. Part of the Great Exhibition of 1851, his *Model Houses for Four Families*, known as 'double houses', were not houses but single-storey flats in a two-storey building that could extend to as many storeys as necessary.¹⁰⁰ A central staircase provided direct access in pairs to two tenements on each floor, each for a single nuclear family (Fig. 41). Within a unit, further spatial divisions separated members of each family into individual rooms to uphold Victorian morality. The staircase access type was subsequently widely used in many tenement buildings, mansion blocks, and council flats.¹⁰¹

Tenements were erected in London by philanthropic model dwelling companies such as the East End Dwellings Company (1882), Metropolitan Association for Improving the Dwellings of the Industrious Classes (1841), Four Per Cent Industrial Dwellings Company (1885), The Improved Industrial Dwellings Company (1863), and Peabody Trust (1862). They were normally buildings between four to six floors tall with a rectangular plan and had a common staircase that could lead to two to five dwellings per floor and deliberately limited social interaction among neighbours. The basic dwelling

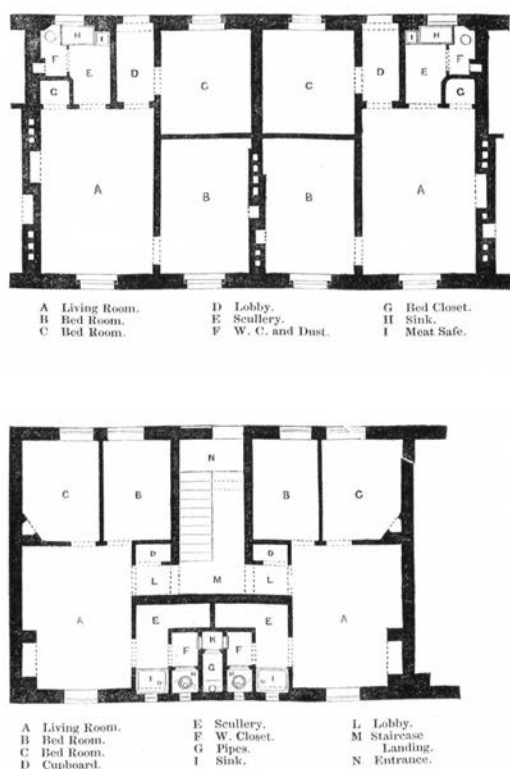


Fig.41
Floor Plans of Two Model Dwellings for Families at Streatham Street
Henry Roberts, *The Dwellings of the Labouring Classes: Their Arrangement and Construction*, 1854

unit consisted of a set of private rooms (bedroom and living room) with access to shared facilities such as water supply, a bathroom, and a central yard for children to play in. The top floor typically had a communal wash house and garbage chute. Units would provide accommodation for different household sizes, with the intention for residents to be able to remain on the estate regardless of changing housing needs. Shared facilities were considered more hygienic, secure, and of greater value, since they were a safe distance from bedrooms and could be easily accessed for maintenance.¹⁰²

There were different common models for tenement buildings. The long internal corridors or gallery access used on earlier estates were soon abandoned and flats were instead grouped around staircases giving direct access. Similar to previous two-storey model dwellings, some tenements with larger flats, such as Bethnal Green Estate (1910) designed by W E Wallis for the Peabody Trust, offered paired direct access to flats. This meant flats were double aspect, in contrast to other tenement blocks with access to four to five flats per floor. This is evident in the Peabody Whitechapel Estate (1881) by Henry Darbishire that has four flats per floor. The Peabody Herne Hill Estate (1902) by W E Wallis has a more compact plan with five flats per floor

102.
Irina Davidovici, 'Chapter Three: Renewable Principles in Henry Astley Darbishire's Peabody Estates, 1864 to 1885', in *Mobilising Housing Histories: Learning from London's Past for a Sustainable Future*, ed. by Peter Guillery and David Kroll (London: RIBA Publishing, 2017), p. 64.

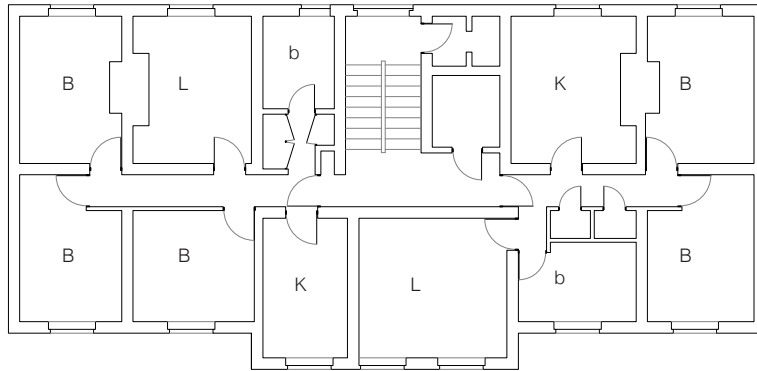


Fig.42
First Floor Plan
Bethnal Green Estate, 1910
Peabody Dwellings, W E Wallis and Victor Wilkin

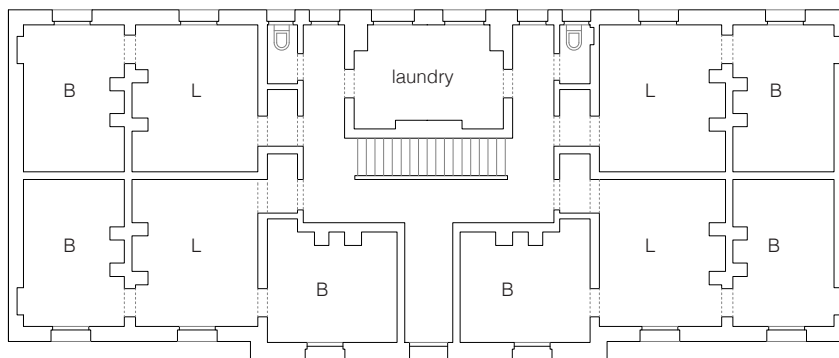


Fig.43
First Floor Plan
Whitechapel Estate, 1881
Peabody Dwellings, Henry Astley Darbishire



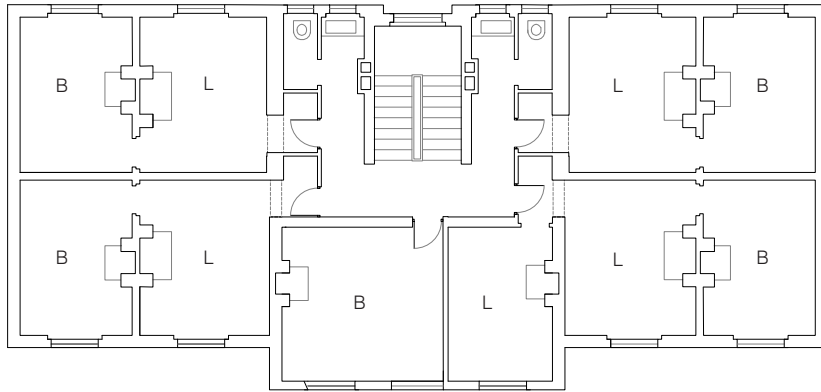


Fig.44
First Floor Plan
Blackfriars Road Estate, Herne Hill, 1902
Peabody Dwellings

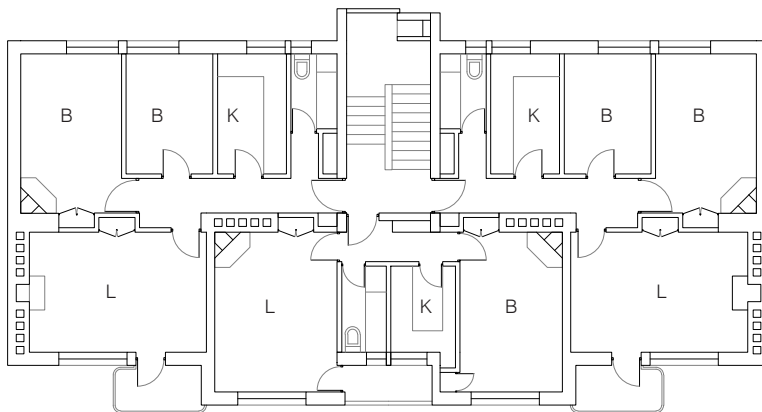


Fig.45
First Floor Plan
Loughborough Park Estate, 1938
Edward Armstrong, Guinness Trust

103.
Other variations replaced the fifth flat with a laundry room on every floor.

and two shared bathrooms, all accessed directly from a communal staircase (Fig. 44).¹⁰³ These more flexible shorter blocks helped planning in subsequent estates, as they could be placed sideways, grouped in rows along narrow streets, and would fit in small plots of land.

104.
Davidovici, p. 57.

105.
Ibid, p. 61.

106.
Evans, p. 102.

107.
Ibid.

The style of philanthropic housing was easily recognisable due to its use of repetition and standardisation (Figs. 42-45). There were strong opinions about tenements, such as the critique published by the Daily News in 1887, stating that Henry Darbishire's designs for Peabody looked 'too much as barracks or workhouses, and too little like dwellings'.¹⁰⁴ The efficient and repetitive layout of tenements represented the pragmatism of Victorian philanthropy, as they were not a new building typology but stacked traditional family dwellings, however, it did also embody 'a new conception of urban and social order'.¹⁰⁵ For Victorian reformers, it was essential to address the moral dilemma of having multiple entries and exits to housing and the indiscriminate use of undifferentiated rooms in slums. As Robin Evans argued, the introduction of corridors in housing was instrumental for social control.¹⁰⁶ Slums had a network of passages and numerous ways of getting around and, as police records show, a wide variety of escape routes.¹⁰⁷ However, the corridor limits the extent of a dwelling, in contrast with the blurred boundaries in a slum that made it difficult to discern between outside and inside or one household and another.

Model dwelling companies continued to exist into the early and mid-twentieth century, but they tended to become smaller. There are exceptions like the Guinness Trust or Peabody Trust that still operate today. The Loughborough Park Estate in Brixton, completed in 1938 and designed by Edward Armstrong, was the last development by the Guinness Trust before World War II (Figs. 45-46). The estate had significantly more amenities as was previously common: a workshop, club room, chapel, drying rooms, fuel stores, and pram and cycle sheds. Also unlike previous developments, this estate had larger flats, ranging from one-bedroom to four-bedroom flats with private bathrooms and kitchens. Kitchens were equipped with gas cookers and gas points in all habitable rooms.¹⁰⁸ Each floor had three flats, all directly accessed from a common staircase as is typical for flats built in the interwar period. While not as desirable as flats arranged in pairs, three flats arranged around a staircase provided two flats with double aspect and one with a single aspect.

108.
F R S Yorke and Frederick Gibberd, *The Modern Flat* (London: Architectural Press, 1958), p. 96.

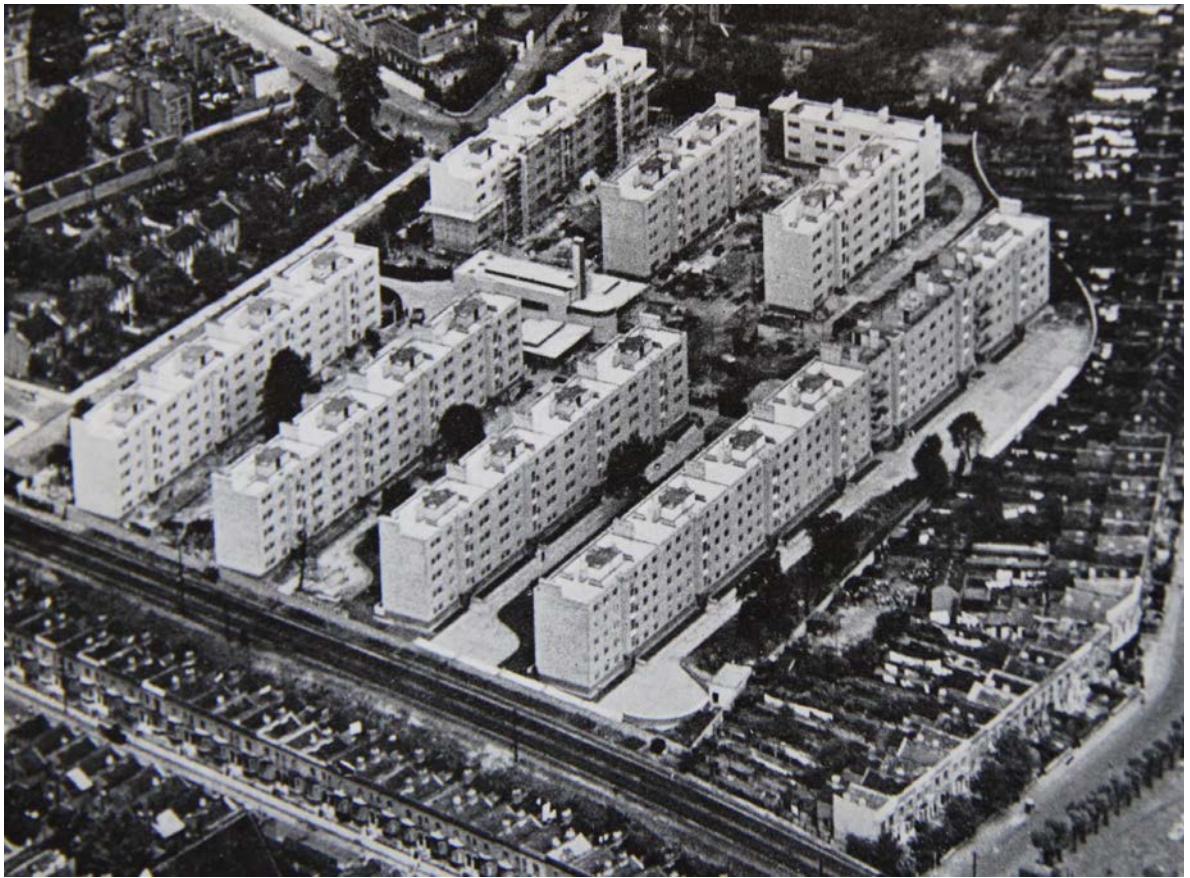


Fig.46
Aerial View
Loughborough Park Estate, 1938
Guinness Trust, Edward Armstrong

LCC Flats

109.
Vladimir Steffel, 'The Boundary Estate: An Example of Urban Redevelopment by the London County Council, 1889-1914', *The Town Planning Review*, 47.2 (1976) p. 164.

110.
This was further improved by the Housing, &c. Act 1923 (Chamberlain Act) and Housing (Financial Provisions) Act 1924 that required all subsidised dwellings to have a fixed bath. Some of the LCC flat types in the 1920s and early 1930s did not have a separate bathroom, but merely a bath in the kitchen, needing special approval by the Ministry of Health.

111.
Steffel, p. 164.

112.
As a reference, Abercrombie's London Plan suggested a maximum of 200 persons per acre.
Ibid, p. 169.

113.
Anthony Wohl, *The Eternal Slum: Housing and Social Policy in Victorian London* (London: Routledge, 2017), p. 284.

At the end of the nineteenth century, local governments such as the London County Council began to design and build their own housing. Built between 1893 and 1900, the Boundary Street Estate in Shoreditch was the LCC's first housing development in one of London's largest former slums. There were some precedents for municipal housing, such as dwellings for labourers in Liverpool (1869) and Birmingham (1889).¹⁰⁹ The scheme designed by Owen Fleming rejected a popular tenement grid plan and was instead designed around a central open space with streets and shops radiating outwards. The LCC aimed to provide housing above the existing minimum building and sanitary standards.¹¹⁰ The housing, made up of three- to five-storeys tall blocks, limited occupancy rates to two persons per room, however, while mainly referring to a bedroom, the living room also counted as a habitable room and was often used for sleeping.¹¹¹ Within the estate's 1,069 dwellings, only 35 shared bathrooms (toilets and baths) were provided, as well as a central laundry that could be used for an additional charge. Benson House and Hedsor House were organised similar to the direct multiple access found in tenement buildings, with four flats and three flats per floor respectively, of which the two lateral flats had a double aspect (Fig. 47). The distance between buildings was one and a half times the building height whenever possible.

The Boundary Street area before slum clearance had a density of 381 persons per acre, which included a hospital, church, and schools, but the Boundary Street Estate that replaced it had a density of only 359 persons per acre. By 1900, however, despite the LCC's aim of fighting overcrowding, 5,380 tenants occupied housing planned for only 4,566 residents. Compared to Bethnal Green's average density of 168 persons per acre, Boundary Estate had a high density, however, Boundary Estate's density is low when compared to the average of other projects build during that period by the East End Dwelling Co. with 647 persons per acre or the Peabody Trust with 700 persons per acre.¹¹² Therefore, the council flat was a significant step forward in terms of designing out overcrowding in comparison to the much higher densities of model dwellings, but overcrowding issues would remain.¹¹³

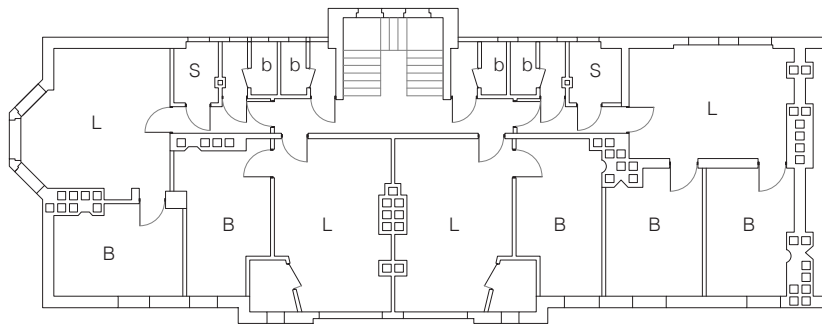


Fig.47
Fourth Floor Plan
Benson Building, Boundary Estate, 1900
London County Council, Owen Fleming

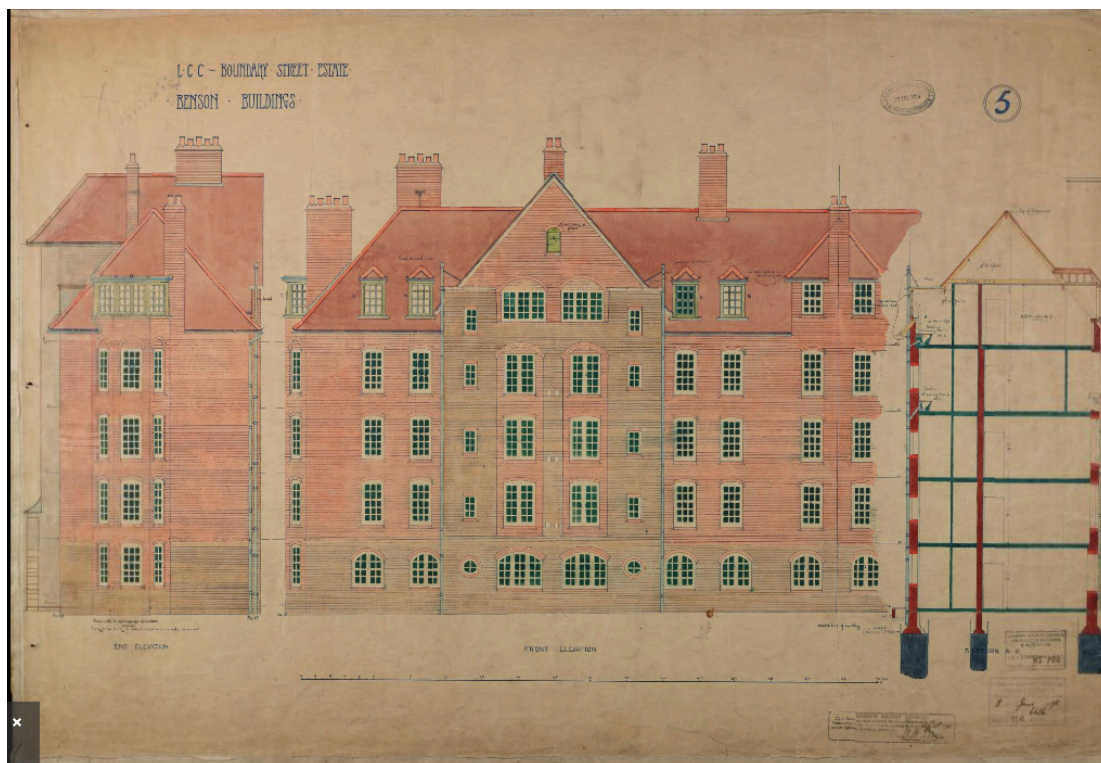
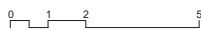


Fig.48
Elevation of Benson Building
Boundary Estate, 1900
London County Council

Mansion Flats

114.
Richard Dennis, 'Chapter Four: Residential Flats: Densification in Victorian and Early Twentieth-Century London', in *Mobilising Housing Histories: Learning from London's Past for a Sustainable Future*, ed. by Peter Guillery and David Kroll (London: RIBA Publishing, 2017), p. 75.

115.
Ibid.

116.
H Muthesius, p. 95.

117.
Sutcliffe, p. 21.

Starting in the 1880s, new models of housing for the middle and upper classes began to emerge. The mansion block, for example, provided both 'bachelor flats' and apartments for wealthy families whose main homes were outside of London but who wanted a second home in the city (Fig.). A mansion block provides self-contained apartments in a typically five- to eight-storeys tall building with three to eight rooms per flat.¹¹⁴ But these 'French flats' were at first largely opposed by its neighbours, who worried their properties would be devalued, with *The Times* describing the mansions as an eyesore that would 'dwarf all the neighbouring houses'.¹¹⁵ In addition to their appearance, their layout of rooms was also criticised, as the design for privacy and family interactions were unsuited to the tastes of the English middle class. Rooms for servants were on the same level as family members, unlike in terraced houses in which servants were accommodated in the basement or attic and had separate entrances and stairs to the back of the building. These flats were also sometimes designed with small continental kitchens and small dining rooms, a trend associated with the growing independence of the modern young woman.¹¹⁶ Popular opinion on the mansion flat is reflected in a letter published in *The Builder* (2 March 1876) that states: '[The Englishman] will not live continuously in any boundary that resembles a hotel. [...] In fact, to make horizontal dwellings really successful in central London, where tall houses are inevitably necessary, the floors must be as thick as party-walls, and sound resisting'.¹¹⁷

Single-storey mansions flats vary greatly in layout and size and use three main access types. Direct access (one per floor), paired direct access, and direct access to multiple units. With only one flat per floor, the grand Gloucester House (1906) in Piccadilly by T E Collcutt and Stanley Hamp was designed with most of the functions expected from a typical upper-class terraced house in mind. Larger than most mansion flats, it has seven bedrooms, a dressing room, drawing room, dining room, smoking room, kitchen and scullery, a larder, servant's hall, and several pantries. Flats in Hanover House (1902) in St. John's Wood by E P Warren have two flats per floor with a paired access, but their layouts are not symmetrical with four bedrooms arranged differently in each flat in response to site conditions (Fig. 50). Others, such as Audley House, have one staircase and lift serving two flanking one-bedroom bachelor flats on each floor that are repeated four times to form a long narrow building (Fig. 51). In Mayfair, an access layout similar to that found in tenement and council blocks is used in Hanover Square (1900) by Paul Hoffman, with four flats per floor the central units opposite the stairs are single aspect while the ones at the extremities are double aspect (Fig. 52).

Robins, Snell & Terry,

Publishers of

No. 2014 Vol. 20 1905.

FLATS

AN ILLUSTRATED PAPER FOR OWNERS & OCCUPIERS
AND ALL INTERESTED IN FLATS AND MAISONETTES

Messrs. ROBINS, SNELL & TERRY'S
REGISTER OF
FURNISHED FLATS
IN ALL PARTS OF LONDON.
CHAMBERS, STUDIOS, &c.

FIFTEENTH YEAR OF PUBLICATION.
UNFURNISHED FLATS
IN ALL PARTS OF LONDON.
UPPER PARTS, HOUSES, &c.

Price 3d. By Post 3d.

AN ENTRANCE

INTERIOR OF A FLAT

A DINING ROOM

Published by the Proprietors
Messrs. ROBINS, SNELL & TERRY,
95 VICTORIA STREET, WESTMINSTER, S.W.
10 THACKERAY STREET, KENSINGTON COURT, W.

OFFICES:
10, Thackeray St., Kensington Court,
 AND
95, VICTORIA STREET, WESTMINSTER S.W.

Fig.49
 Mansion Flats Propaganda
 Messrs. Robins, Snell & Terry, *Flats*, 1905

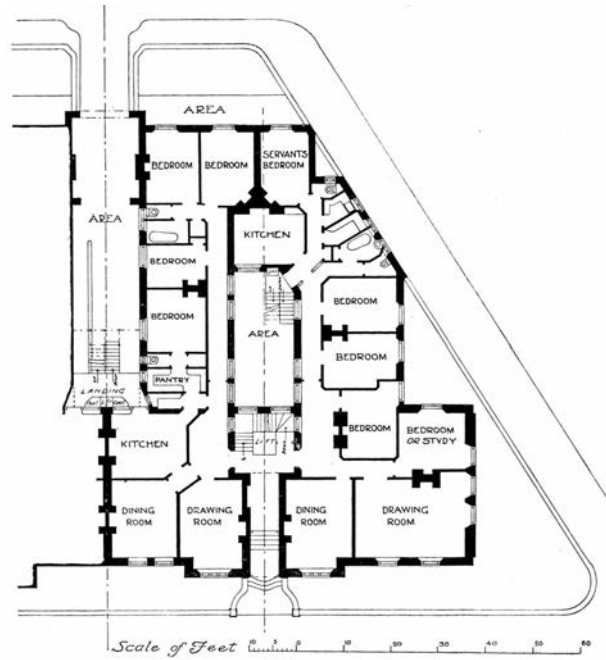


Fig.50
First Floor Plan
Hanover House, St. John's Woods, 1902
E.P. Warren

118.
Dennis, p. 85.

119.
The Middle Class Dwellings Company was formed in 1888 to build mansion flats. The chairman, Richard Farrant was also deputy chairman and managing director of the Artizans' Labourers' & General Dwellings Company, known for its suburban cottage estates.

120.
Dennis, p. 85.

121.
Ibid.

A critical shift in the development and management of flats occurred when they became part of a large commercial property portfolio. For example, City & West End Properties Ltd was formed in 1897 to manage flats in Chelsea, Westminster, and Knightsbridge.¹¹⁸ The developers of mansion blocks were frequently also working for the companies building model housing.¹¹⁹ While developing housing for both workers and the middle-class, they maintained a 'geographical and commercial segregation between their philanthropic and commercial activities', leading to a commercialisation of housing built at scale.¹²⁰

Compared to the scale of two- to three-storey terraced housing built during the nineteenth-century, the mansion flat represents a substantial increase in density. The report *Housing London: A Mid-Rise Solution* (2014) by the Prince's Foundation for Building Community, praised the mansion block as a solution for sustainable urbanism. The report notes that Paris during the Haussmann era had commonly six-storey mansion blocks arranged around a private courtyard with more than 227 dwellings per hectare, while London's densest borough at the time of the report, Kensington and Chelsea, only had an average of 70 dwellings per hectare.¹²¹

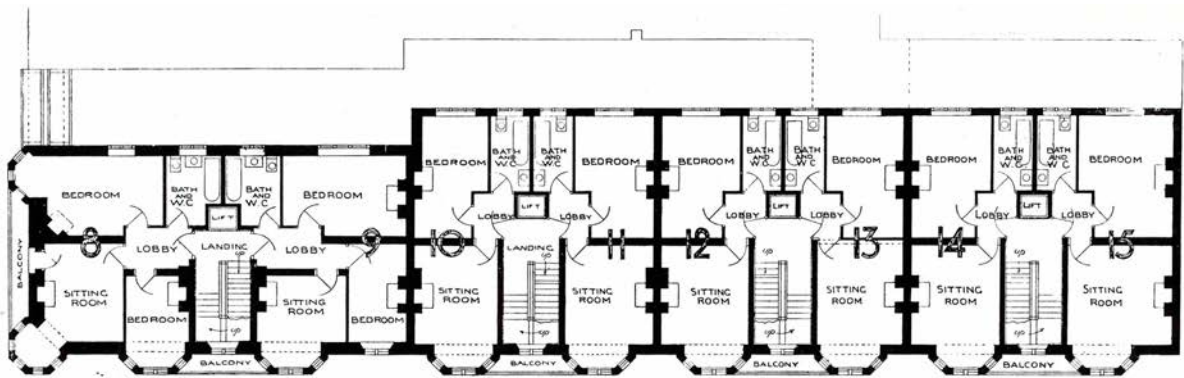


Fig.51
First Floor Plan
Audley House, Westminster, 1907
J.W. Simpson and M. Ayrton

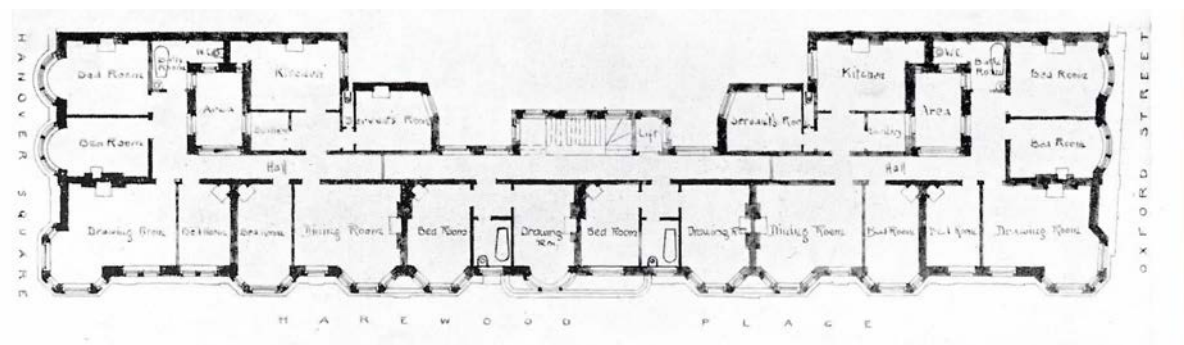


Fig.52
First Floor Plan
Hanover Square, 1900
Paul Hoffman

Modernist Flats

122.
Alison Ravetz, 'From Working-class Tenement to Modern Flat: Local Authorities and Multi-storey Housing between the Wars', in *Multi-storey Living: The British Working-class Experience*, ed. by Anthony Sutcliffe (London: Croom Helm, 1974), p. 122.

123.
Ravetz, *Place*, p. 43.

By 1930, privately built blocks of flats for middle-class residents were appearing in London.¹²² They became a popular form of investment and were marketed as luxurious and labour-saving.¹²³ Flats were in particular promoted as economic and viable housing solutions by charities, housing reformers, and industries such as gas companies, which would have a large impact on the design of homes. The Ascot Water Heater Company published *Flats: Municipal and Private Enterprise* (1938) to discuss the benefits of projects such as Kensal House and the LCC's Church Street, fitted with gas appliances (Fig.). Flats were equipped with modern kitchens, inspired by the Frankfurt kitchen designed by Margarete Schütte-Lihotzky in 1926, which was suitable for both houses and flats due to its galley kitchen layout. These kitchens with cupboards saved space and came with gas and electric refrigerators and deep sinks. The instantaneous water heater, first invented in the previous century but improved in the 1920s, was widely installed now in council flats, and the commercial Ascot water heater was very popular in the 1930s (Figs. 53-54).

Advocates of the flat included Frederick Gibberd and F R S Yorke, authors of *The Modern Flat* (1937) in which it was compared to the detached house or 'villa' and the suburban sprawl they caused. Despite growing interest in flats, however, they never accounted for more than a fourth of municipal housing in London between 1920 and 1930.¹²⁴ But the Slum Clearance Act 1930 encouraged local authorities to build flats by giving them more power to use compulsory purchase orders to obtain land for the development of rental properties. The belief was that the building cost for flats should be lower than that for houses, however, flats were in fact more expensive to build than non-parlour houses.¹²⁵ The high building costs were partly due to the requirement to install a passenger lift in taller buildings, which was reflected in high rents and made it difficult to prove that flats could be an economic housing solution.

124.
Ravetz, *Tenement*, p. 123.

125.
A three bedroom house in the early 1930s was on average £400 while flat costs ranged from £435 in 1934 to £600 in the late 1930s. The Ossulton Estate cost £617 per unit. See, Ravetz, *Tenement*, p. 127.

In 1935, LCC delegates who had been sent to Germany, Austria, Holland, and France to study different social housing developments, recommended on their return that English dwelling standards be maintained (the provision of hot water and a private bath or bathroom) but combined with the higher density and provision of public amenities found in European models.¹²⁶ The Modern Movement also brought with it new building technologies, with flats above five or six storeys now built in a steel frame construction. The LCC Ossulton Estate (1927) by G Topham Forrest is an early example of this. At the same time, buildings using reinforced concrete frames and patent systems made construction more efficient, allowing internal walls to be non-loadbearing, thinner, and from cheaper materials.

126.
Ibid, p. 34.

While the Modern Movement in England influenced the design of private houses, its greatest impact was on the design of blocks of flats (Fig.). One of the most celebrated modernist middle-class housing projects is Highpoint One (1935–38), two apartment blocks originally planned by

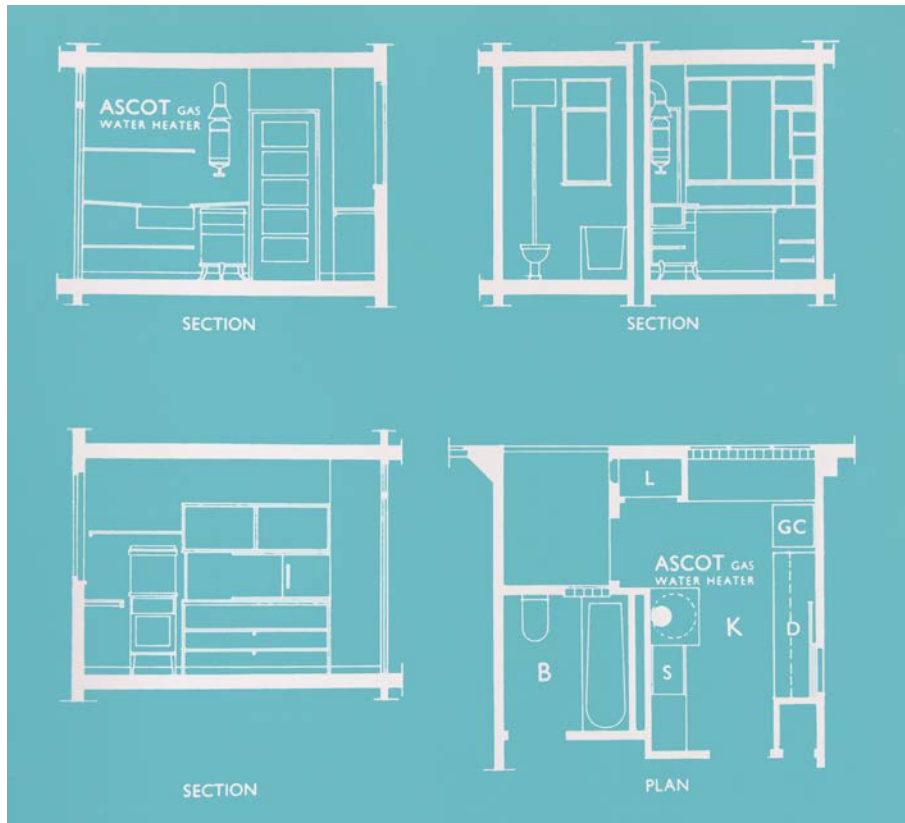


Fig.53
Section and Floor Plans
3 Bedroom Flat, Kensal House, 1936
Gas, Light and Coke Company



Fig.54
Photograph of Interwar Kitchen in Kensal House
Ascot Water Heater Company Book, *Flats: Municipal and Private Enterprise*, 1938

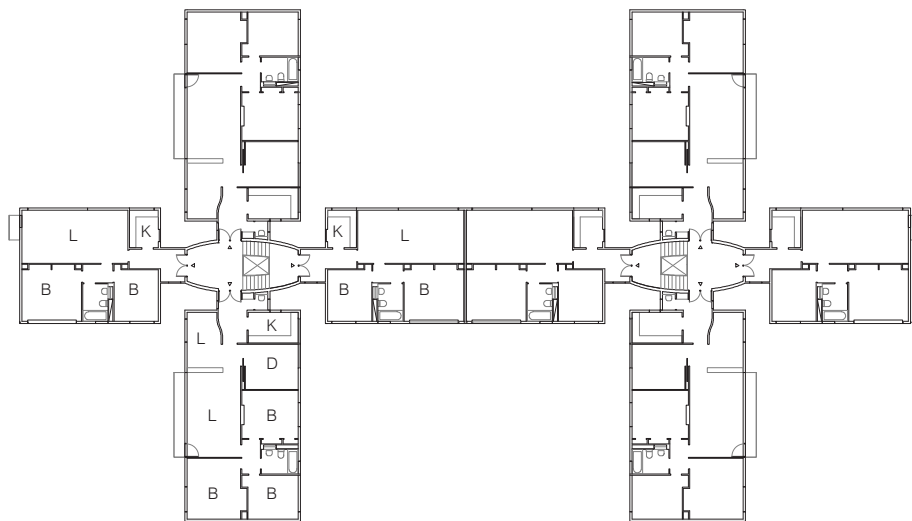


Fig.55
Typical Floor Plan (1:500)
1 and 3 Bedroom Flats, High Point Flats, Highgate, 1935
Berthold Lubetkin



Fig.56
Photograph of Exterior
High Point Flats, Highgate, 1935
Berthold Lubetkin

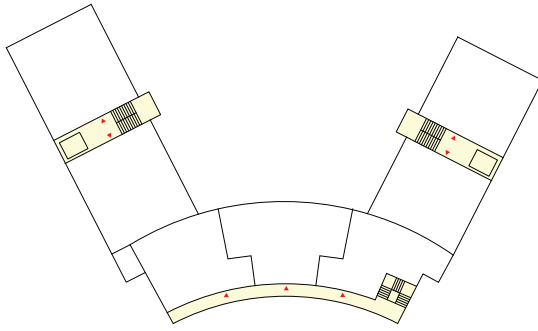


Fig.57
First Floor Plan
Church Street, Stoke Newington, 1937
London County Council

Berthold Lubetkin for the employees of the Gestetner Company, which used a reinforced concrete structure. The project's cruciform plan layout was designed to maximise sunlight in its double- and triple-aspect units, with a central core providing access to four flats per floor (Figs. 55-56). Many designers at this time favoured access via staircases common to continental high-rise flats, with one staircase and lift giving direct access to pairs of flats. Kensal House (1937), the first modernist housing estate designed by Maxwell Fry for the Gas Light and Coke Company is an influential prewar example of this, also including a community centre, communal laundry, canteen, and a nursery school. While council housing projects preferred gallery access to reduce the cost of enclosed spaces, there are examples with a mix of both gallery access and paired unit access such as the LCC's Church Street development of 1937 in Stoke Newington (Fig. 57).

The Modern Movement, in particular in Germany in the 1930s, also developed a popular housing layout with buildings arranged in parallel rows, known as *Zeilenbau*. Primarily developed by Walter Gropius, he argued that flats should be oriented from north to south regardless of street patterns to maximise natural daylight. The slender *Zeilenbau* housing blocks of the 1930s were long but limited in height to a maximum of 8 to 12 storeys to optimise sunlight between linear blocks. Most major private modernist blocks of flats built in the 1930s, however, such as Highpoint One and Pullman Court (1936) did not use the continental *Zeilenbau* principle but a cruciform or semi-courtyard plan (U-shape).¹²⁷ The first project in Britain to fully adopt the *Zeilenbau* principle was Churchill Gardens in Westminster, designed by Powell and Moya for a competition in 1946. The scheme had a dozen slab blocks of ten storeys organised in parallel rows. Flats were accessed in pairs from a shared stair and lift core (Figs. 58-59).

127.
Glendinning and Muthesius, p. 39



Fig.58
Exterior of Churchill Gardens
Churchill Gardens, 1946-62
Powell & Moya
[Draft: Update with high-res image]

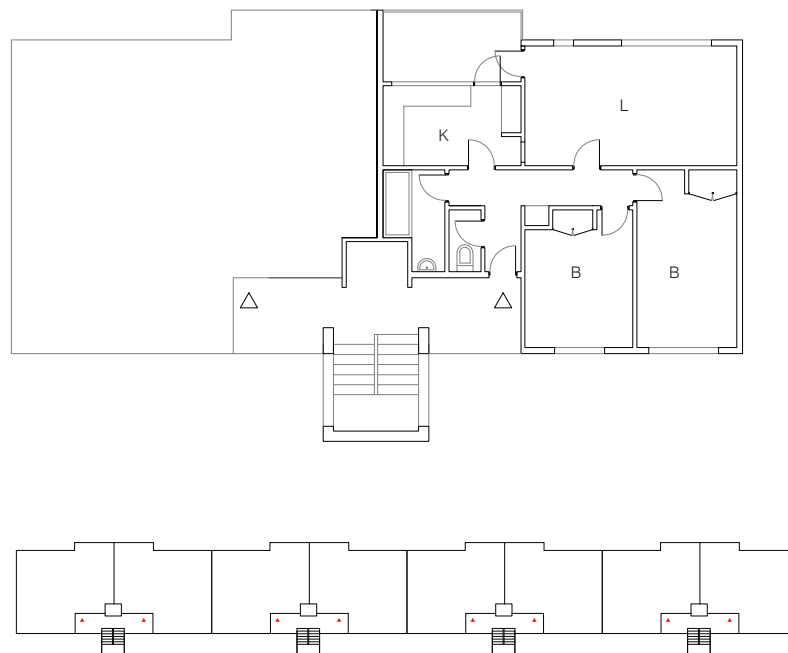
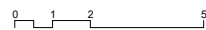


Fig.59
Interior Plan and Building Layout (1:500)
Churchill Gardens, 1946-62
Powell & Moya



High-rise Tower Blocks

Starting in the mid-1940s, there was a growing acceptance of flats as a suitable response to the housing shortage and reconstruction needs in Britain. The terms 'multi-storey' and 'tower block' were now commonly used, and by 1953 'point block' and 'slab block' would also be employed.¹²⁸ Appearing in Britain by the late 1940s, the tower block is a high-rise building with a central core around which flats are grouped. This layout makes the shared circulation efficient but usually means that the number of flats is limited to a maximum of four per floor.

While the *Dudley Report* (1944) required all housing blocks over three floors to have passenger lifts, effectively limiting their design to three storeys due to the high cost of lifts, the introduction of a lift subsidy in 1946 encouraged the building of tower blocks.¹²⁹ Post-war destruction and a drive for modernisation gave urgency to fast reconstruction. The increasing land costs and shortage of centrally located development land encouraged high-density housing schemes. The 'modern' post-war home was radically different from previous forms of housing, and in many cases inspired the development of new dwelling typologies: multi-storey and high-density buildings with flats that used new methods of construction.¹³⁰ The introduction of progressive height subsidies by the Housing Act of 1956, gave a further boost to high-rise buildings, and despite their high construction cost, the central government supported them to achieve desired higher densities.¹³¹ Financial incentives, slum clearance programmes, and post-war reconstruction were thus key to the development of tower blocks. While flats in high-rise blocks of 20 storeys or more made up only 11.4% of the LCC housing stock in 1965, through the work of the GLC this rose to 19.5% by the late 1960s and early 1970s.¹³²

Tower blocks were frequently criticised as standing in isolation with little if any relationship to their surroundings. However, they had several advantages over the contemporary long slab blocks in the *Zeilenbau* arrangement when the site was small or the ground topography uneven. For example, with four flats per floor, each could be located in the corner of the building and have double aspects. Additionally, there was no need for large shared circulation spaces, as flats could be efficiently accessed directly from a vertical core. The *Dudley Report* discussed Y- and H-shaped plans for tower blocks and their benefits for natural light in comparison to the previously common closed courtyard or semi-courtyard layout. While only a few projects of the Y-plan were built, with Perkins Heights (1953) a typical but un-built example, the H-plan is widespread as can be seen in the tower blocks in Thamesmead (1972) in Greenwich built by the GLC (Fig. 60). In the H-plan, stairs and lifts are placed in the centre and, because of the fire regulations at the time, the landings are relatively open on two sides, making the building appear detached from each side (Fig. 61).

128.
Ibid, p. 56.

129.
Ravetz, *Place*, p. 50.

130.
Glendinning and Muthesius, p. 9.

131.
Simon Pepper, 'High-rise Housing in London, c.1940 to c.1970', in *Mobilising Housing Histories: Learning from London's Past for a Sustainable Future*, ed. by Peter Guillery and David Kroll (London: RIBA Publishing, 2017), p. 124.

132.
The London County Council was replaced by the Greater London Council in 1965.

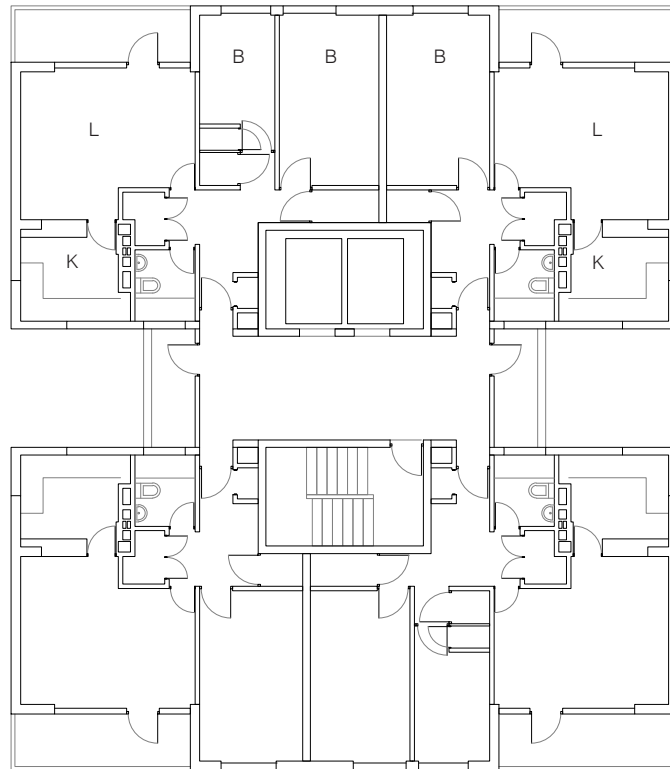
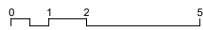


Fig.61
First Floor Plan
Point Block, Thamesmead Area 1, 1972
Greater London Council



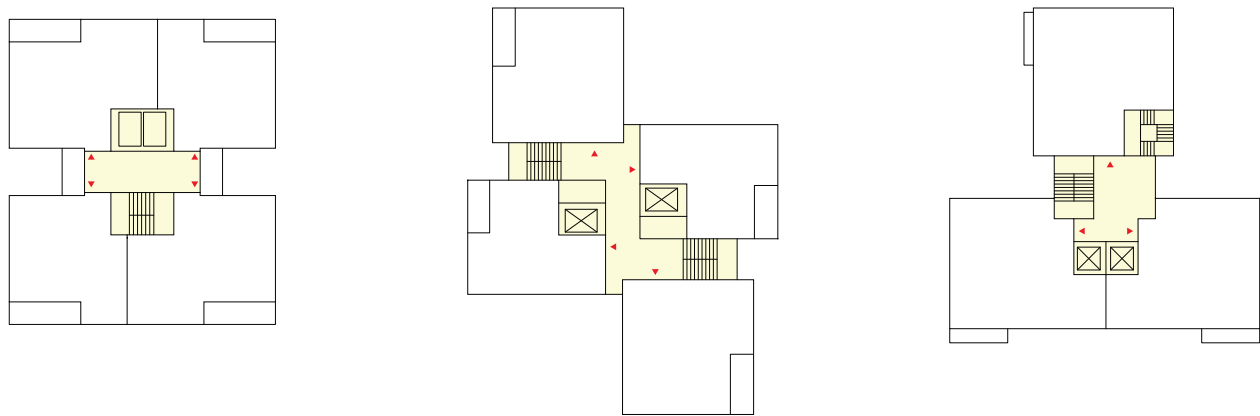


Fig.60 (left to right)

H-Plan Layout, Thamesmead Area 1, 1972, Greater London Council
 Pinwheel Plan Layout, Claremont Estate, 1957, London County Council
 T-Plan Layout, Myrnerne Court, 1954, London County Council

One of the LCC's first tower blocks is Alton East, built in 1951 under Rosemary Stjernstedt as part of the Roehampton Estate. Together with Alton West (1959), the estate provides 2,000 homes, three schools, a community centre, a library, and a myriad of shops. Its development – split between two phases and designed by different teams of LCC architects – is representative of the different styles that influenced British architecture during this time. The Alton East phase, completed in 1958, has a mix of ten-storey tower blocks with four flats per floor, four-storey maisonettes, and two-storey terraced houses (Fig.). The estate promotes a form of modernism that is sensitive to its immediate context while continuing to reference more traditional British architecture.¹³³ Examples of taller point blocks include Columbia Point and Regina Point on Canada Estate in Bermondsey (1962–64) designed by the LCC Architects Department led by Colin Lucas, which has two 21-storey towers with a concrete structure. These projects also included low-rise building typologies of no more than four floors (Fig. 62). But the isolation of high-rises and brutalist aesthetics was not popular among tenants. Other tower blocks include the 18-storey LCC Brandon Estate (1957) by E E Hollamby and the 21-storey Warwick Crescent (1961) by L Hunter. London has just over 700 of these residential high-rise buildings (11 floors or more), of which over 500 were built between the late 1950s and late 1970s. Construction of tower blocks peaked in 1967, when 68 high-rises were completed, but largely stopped until the late 1990s. Between 1998 and 2014, however, 159 new high-rise residential buildings were built at a scale formerly unseen in the city, with a large percentage reaching heights of 31 floors or more.¹³⁴

133.
 The use of pitched roofs, timber panelling, decorative brickwork, streets, and squares, however, is informed by Swedish modernist architecture. See Nicholas Bullock, *Building the Post-War World: Modern Architecture and Reconstruction in Britain* (London: Routledge, 2002), p. 90.

134.
 Gleeson, p. 19.

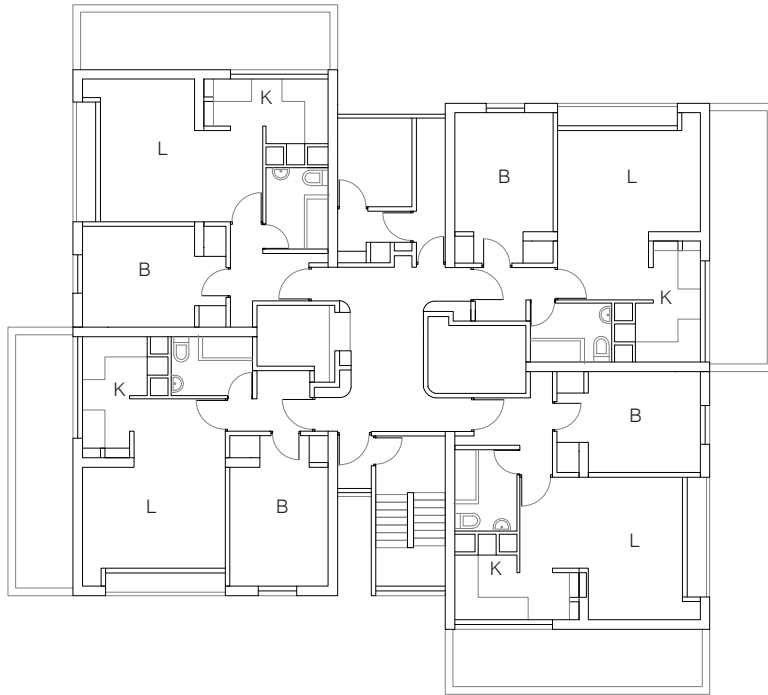


Fig.62
 Plan of Floors 5,9,13 and 17
 1 Bedroom Flats, Canada Estate, Bermondsey, 1962
 LCC Architects Department, Colin Lucas

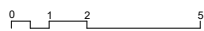
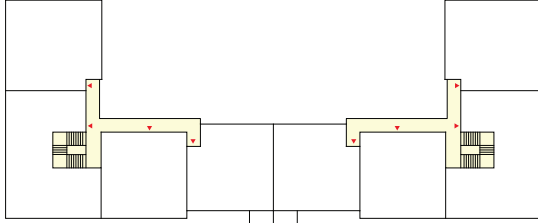


Fig.63
 Canada Estate, Bermondsey, 1962
 LCC Architects Department, Colin Lucas
 [Draft: Update with high-res image]

Exterior Gallery Access



Richmond Grove, Islington, 1937



Fig.64
Photograph of Exterior
Richmond Grove, Islington, 1937
Loundon County Council

Gallery access, also known as ‘balcony’ or ‘deck’ access is one the most common forms of multi-dwelling access in Britain found in buildings of all heights. One of the first examples is a tenement, the Model Houses for Families (1850) in Streatham Street, Bloomsbury, designed by Henry Roberts’ for the Society for Improving the Conditions of the Labouring Classes. The five-storey building is arranged in a U-shape around a central courtyard, with open galleries providing access to self-contained flats (Fig. 65). The open galleries were favoured as they avoided enclosed and poorly ventilated corridors associated with slums and were cheaper to build. In interwar flats,

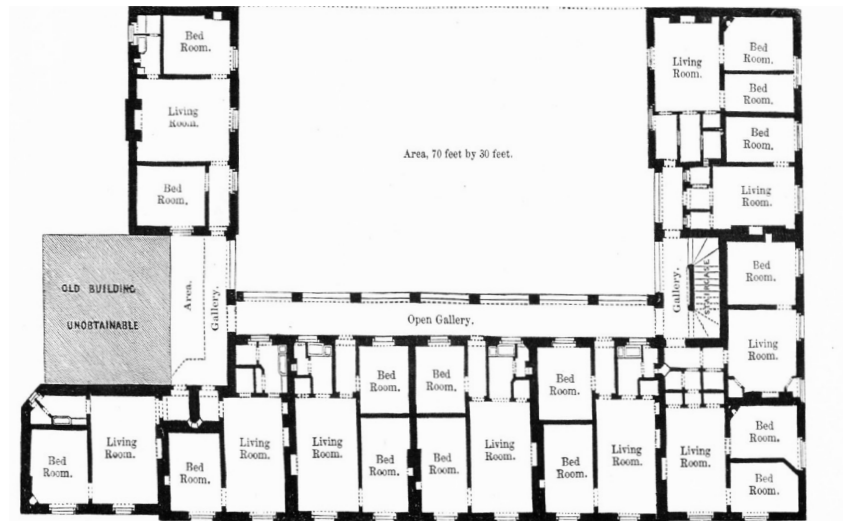


Fig.65
Model Houses for Families in Streatham Street, Bloomsbury
Henry Roberts, *Society for Improving the Condition of the Labouring Classes*, 1850

135.
'Public Housing in Poplar: The Inter-war Years', in *Survey of London: Volumes 43 and 44, Poplar, Blackwall and Isle of Dogs*, ed. by Hermione Hobhouse (London: London County Council, 1994), p. 23.

the LCC decided access balconies would have a solid parapet wall instead of railings, arguing it gave tenants more privacy, better protection from the weather and required less maintenance.¹³⁵

A celebrated building with access balconies is the modernist Lawn Road Flats (Isokon Building) designed by Wells Coates. A private development consisting mainly of studio flats, it opened in 1934 and explored new ways of urban living with minimal interiors, a communal kitchen, and a ground floor bar. The building was the first slab block ever to be built mainly in reinforced concrete, featuring a cantilevered stairwell and access decks over four floors (Fig. 66).

In contrast to developments based on European models that favoured paired unit access from a staircase, British housing typical for the 1930s however used principles derived from neo-Georgian brick housing typologies, as can be seen in the early example of Tabard Garden (1925) in Southwark by the LCC and designed by G Topham Forest and the later Stamford Hill Estate (1931) in Hackney also by the LCC. These developments have brick facades, small-paned windows, and rear elevations with access balconies. The LCC often concealed the access galleries behind the main facades or around the interior of courtyards, for example, Kennington Park Estate (1936) by E P Wheeler is arranged in a semi-courtyard layout (U-form) with access balconies facing towards the centre, and living rooms and bedrooms facing outwards (Fig. 68). However, in John Scurr House (1937) designed by Adshead & Ramsey for Stepney Borough Council, the access galleries

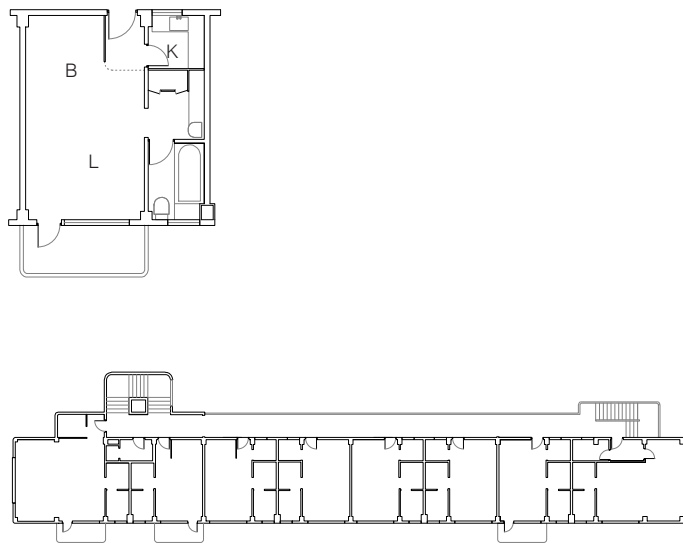
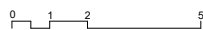


Fig.66
Flat Floor Plan and Building Layout (1:500)
1 Bedroom Flat, Lawn Road (Isokon Flats), 1934
Wells Coates



ran around the outside of the building, with the main rooms and private balconies overlooking the internal courtyard to protect them from the traffic noise coming from the Rotherhithe tunnel entrance (Fig. 67).¹³⁶ Others such as Richmond Grove (1937) in Islington by Alan Brace for the Compton Housing Association, have shorter access galleries that do not extend to the entire length of the block, with two staircases per floor and four flats per staircase at their ends (Fig. 64).

Subsequent post-war LCC estates favoured the row and L-shape block plans over the U-shape plan, as it contained 'fewer corner flats and generally permitted tidier and simpler planning', and examples from this time include access galleries alternating between floors.¹³⁷ Although the alternating galleries were used mostly for two-storey maisonettes, they can also be found in tower blocks of single-storey flats. Gallery access to flats is a common feature of UK public housing, still widely used in contemporary housing schemes (Fig. 69). Compared to flats with internal corridors that tend to have single-aspect flats, gallery access can benefit from double-aspect flats with natural cross ventilation. While practical and economic, the access gallery has been regularly criticised by designers and users alike for a lack of privacy, a problem experienced in particular by flats next to lifts or stairs. Also, to have bedrooms face south, the gallery and less private spaces such as the kitchen, are often placed north-facing and exposed to cold winds, especially at greater heights and in longer blocks.

136.
Simon Pepper and Peter Richmond,
'Stepney and the Politics of High-Rise
Housing: Limehouse Fields to John
Scurr House 1925–1937', *The London
Journal*, 34.1 (2009), p. 48.

137.
LCC and Segal, p. 39.

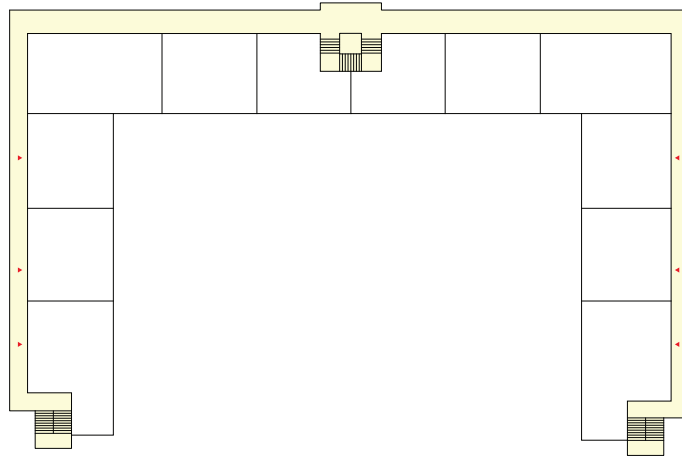


Fig.67
John Scurr House, Stepney, 1937
London County Council

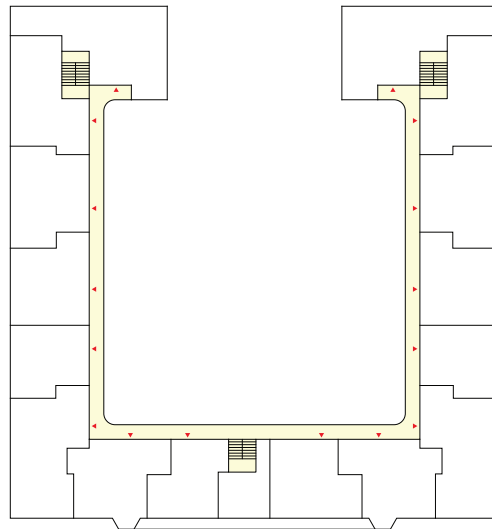


Fig.68
Kennington Park Estate, 1936
London County Council

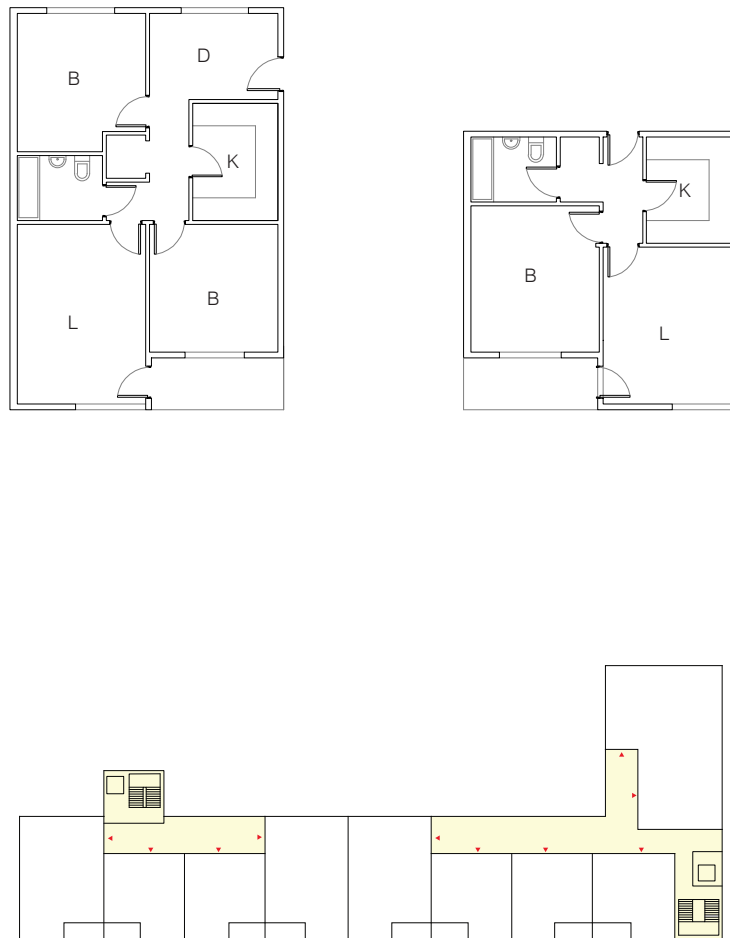
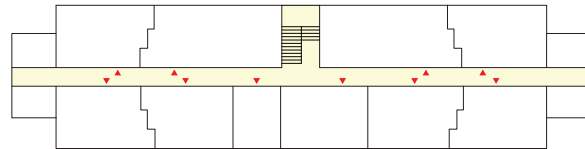


Fig.69
 Floor Plans and Building Layout(1:500)
 2 and 1 Bedroom Flats, Tower Hamlets Community Housing, 2004
 Tower Hamlets Community Housing

0 1 2 5

Internal Access Corridor



Islington Peabody Estate, Islington, 1865

Internal corridors can either be single-loaded, with access to flats placed to one side only, or are double-loaded, with entries to flats on either side. In the UK, single-loaded access similar to corridors is more commonly found in exterior gallery access, while fully enclosed single-loaded corridors are rare. Internal circulation corridors tend to require more maintenance since they need to be artificially lit, ventilated, and fireproof to comply with building regulations. Units placed along internal corridors tend to be single aspect, except for flats placed at the ends, and can therefore lack natural light and ventilation. An access corridor is best suited for one- or two-bedroom flats that typically have their habitable rooms (bedroom and living room) and windows facing out while service areas (kitchen and bathrooms) are mechanically ventilated. But even with small flats, there is always the problem of avoiding long and dark internal corridors within a unit. The *London Housing Design Guide* (2010) recommends that when 'dwellings are accessed via an internal corridor, the corridor should receive natural light and adequate ventilation.'¹³⁸

138.
Design For London, *London Housing Design Guide: Interim Edition* (London: Mayor of London, 2010), p. 12.

139.
Simon Pepper and David Yeomans, 'Working Class Flats in the 1930s: Steel versus Concrete', in *2nd International Conference of Construction History* vol. 3, ed. by M Dunkeld (Cambridge: Construction History Society, 2016), p. 2519.

Internal corridors were used as early as tenement flats. The Peabody Estate (1865) in Islington by Henry Darbishire is an early example of single-aspect units accessed through a central corridor. However, access corridors were not generally approved of, due to a lack of natural ventilation that was considered essential by medical authorities.¹³⁹ But the corridor was often used in the interwar period by the private sector in dwellings designed to minimise the number of staircases. An example of this is Dorset House (1935) in Marylebone by T P Bennett that has a staircase and internal corridor serving every four to five flats per floor (Fig. 70). Unlike most other housing layouts with central corridors, these flats are dual aspect, which was achieved by having more stairwells with shorter corridors and flats 'stemming' out from a semi-enclosed courtyard.

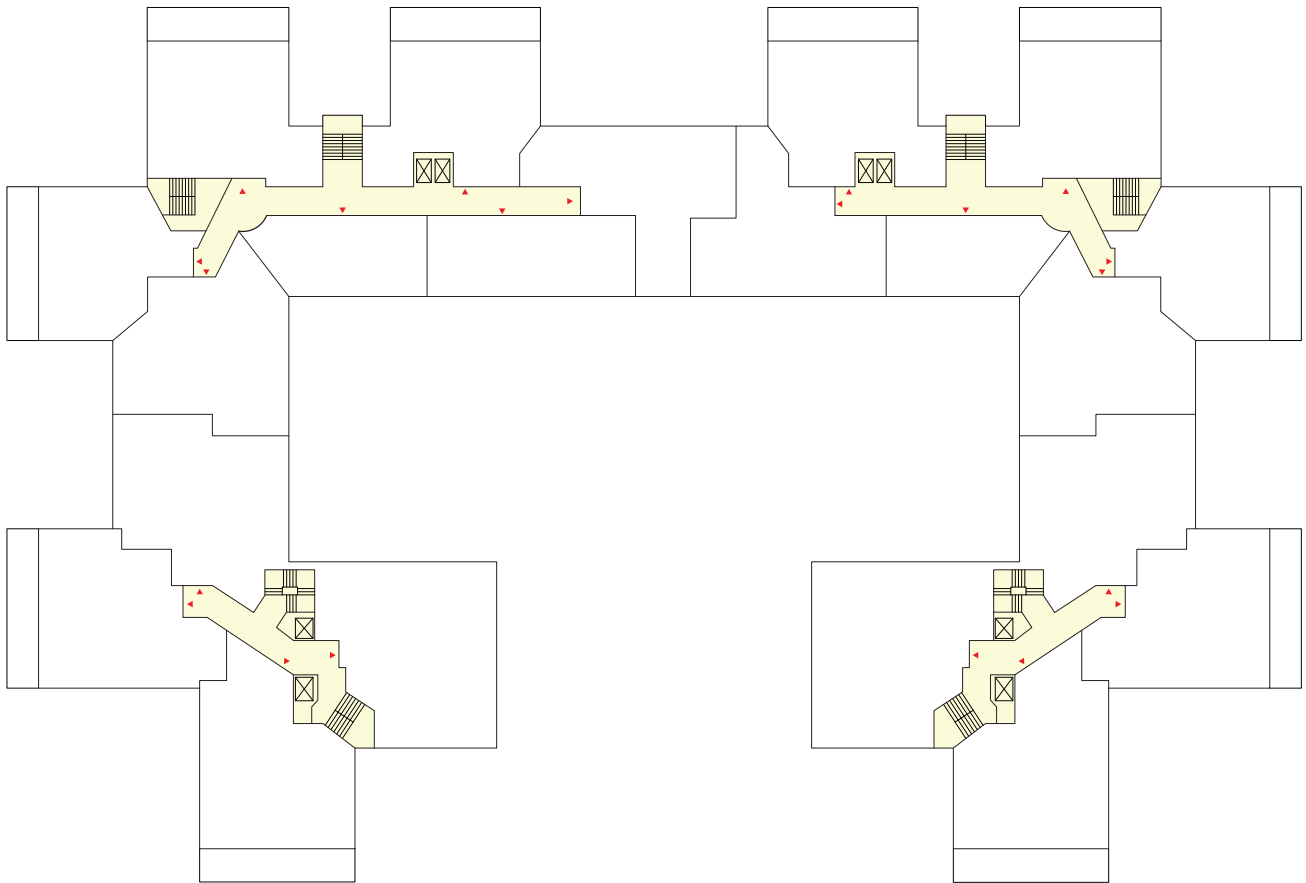


Fig.70
Building Layout (1:500)
Dorset House, Marylebone, 1935
T.P. Bennet

While atypical in the UK, the 31-storey Trellick Tower (1972) designed by Erno Goldfinger has enclosed single-loaded corridors every three floors (Figs. 71-72). The enclosed galleries provide entrances for two-bedroom flats above and below and to one-bedroom flats on the gallery level (kitchens overlooking the gallery), as well as access to four-bedroom maisonettes. On the opposite south elevation, every flat is set back behind a balcony, with floor-to-ceiling windows to the living room and kitchen or the living room and bedroom. The Trellick Tower's spacious interiors exceed the Parker Morris standards, which were in use at the time.¹⁴⁰

140.
Glendinning and Muthesius, p. 100.

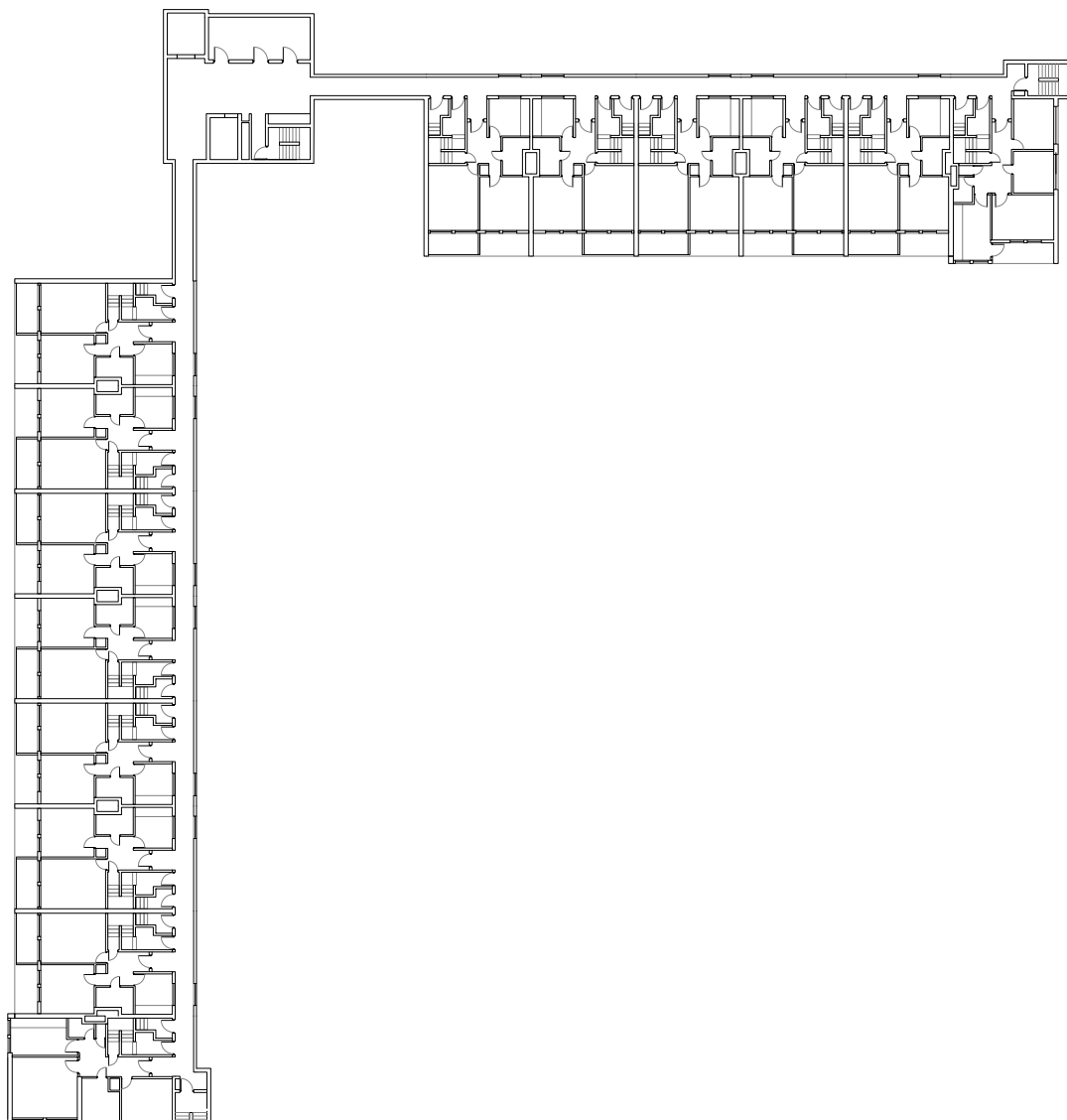


Fig.71
Building Plan (1:500)
Trellick Tower, Kensal Town, 1972
Erno Goldfinger

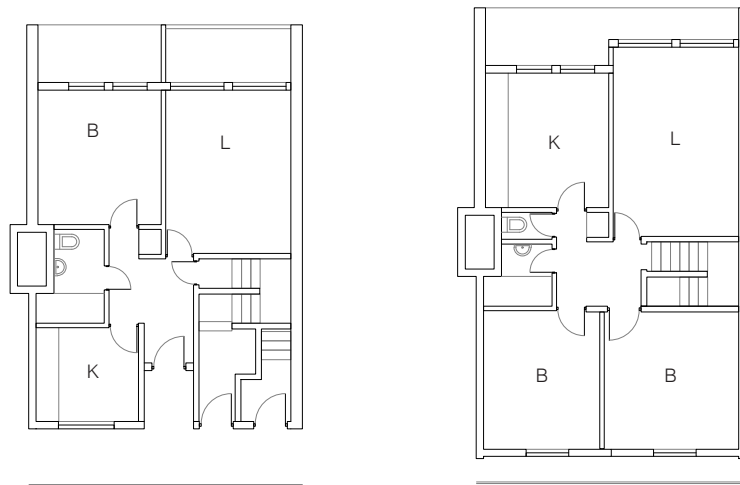


Fig.72
Image of Internal Access Corridor and First Floor Plans
1 and 2 Bedroom Flats, Trelick Tower, Kensal Town, 1972
Erno Goldfinger

0 1 2 5

Building Regulations

In the Building Regulations, the design of dwellings and circulation spaces is regulated among others by the *Approved Document Part B: Fire safety* (2020) through maximum safe travel distances within a property in the case of fire. The maximum travel distance within a block of flats, for example, from the dwelling entrance door to common stairs or an emergency stair lobby, is 7.5 m if escape is possible only in one direction or 30 m if there is an alternative means of escape into another direction. The regulations further require a fire-protected staircase and escape route to a final exit on the ground level and limit the use of a standard single staircase to three storeys.¹⁴¹ In taller buildings, a larger double staircase is required, determining the safe space needed to use entrances, hallways, and landings. While open gallery access complies with the requirements, today internal corridors are most often used (Fig. 73). Generally, regulated escape distances not only dictate the overall size of a building but equally restrict the size and distribution of flats and their access within it, which has an impact on the number of bedrooms and occupants a flat can accommodate. Flexibility in the unit layout is further limited by regulations that stipulate that dwellings must have a fire-protected corridor leading from the dwelling entrance door to all habitable rooms of no more than 9 m or an alternative exit (Fig. 74).¹⁴² A typical contemporary layout of an internal corridor is used in the Woodberry Down Estate Regeneration (2013) by Hawkins Brown (Fig. 76).

The dimensional and quantitative nature of the building regulations often results in qualitative aspects of space to be overlooked. This is particularly evident in *Part F: Ventilation* (2010) that defines what a ‘habitable’ room is in relation to the quality of air and airflow within the home, in parts relying on passive or mechanical ventilation, but does not consider the quality of space or user behaviour. For example, it permits rooms without openable windows to be ventilated either through another habitable room or conservatory (Fig. 75) – defining a habitable room as ‘a room used for dwelling purposes but which is not solely a kitchen, utility room, bathroom, cellar, or sanitary accommodation.’¹⁴³

Another example is accessibility requirements. *Part M: Access and Use of Buildings* (2020) regulates WC and threshold design as well as the size and location of elements in the dwelling the building overall. For example, communal and private entrances should be at least 775 mm wide, with a more generous optional requirement that advocates an 850 mm opening with a clear turning circle of 1,500 mm inside dwelling entrance and accompanying storage areas.¹⁴⁴ As noted by Rob Imrie, however, current regulations around accessibility do not significantly address the real housing needs of disabled people, as they fail to account for other sensory and cognitive impairments beyond reduced mobility.¹⁴⁵

141.
Department for Communities and Local Government, *Approved Document B Vol. 1: Fire Safety in Dwellings* (London: RIBA Publishing, 2010), p. 28.

142.
Ibid., p. 22.

143.
Department for Communities and Local Government, *Approved Document F: Ventilation* (London: RIBA Publishing, 2010), p. 8.

144.
Storage requirement of 1.5m² for a 1-bed property, 2m² for a 2-bed, and 2.5m² for a 3-bed.

145.
‘The Impact of Part M on the Design of New Housing’, Reports, Joseph Rowntree Foundation <<https://www.jrf.org.uk/report/impact-part-m-design-new-housing>> [accessed 11 July 2020].

See paras 3.27 and 3.36

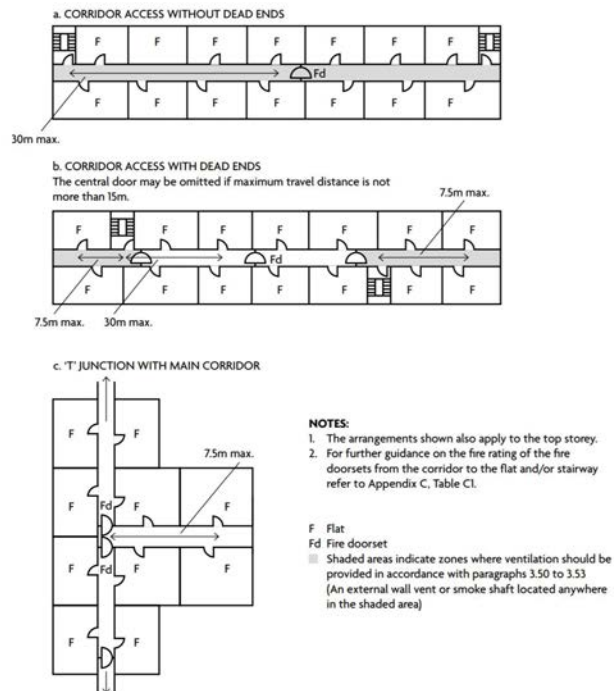


Diagram 3.8 Flats served by more than one common stair

See paras 3.27 and 3.36

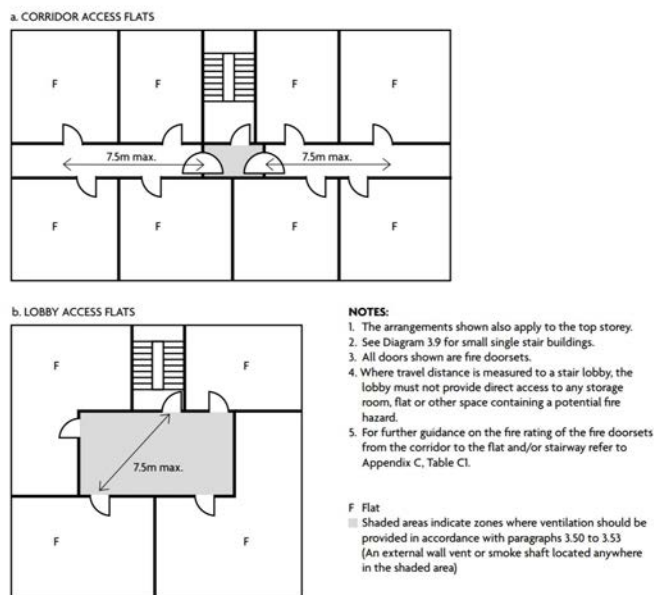


Diagram 3.7 Flats served by one common stair

Fig.73

Approved Document B: Fire Safety

Ministry of Housing, Communities and Local Government, The Building Regulations, 2010

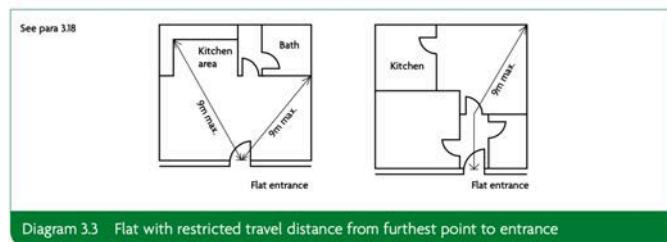
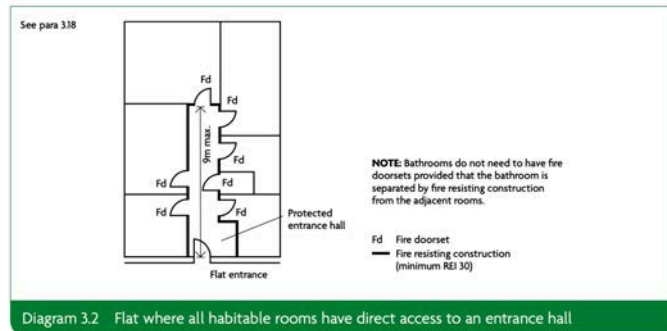


Fig.74
Approved Document B: Fire Safety
Ministry of Housing, Communities and Local Government, The Building Regulations, 2010

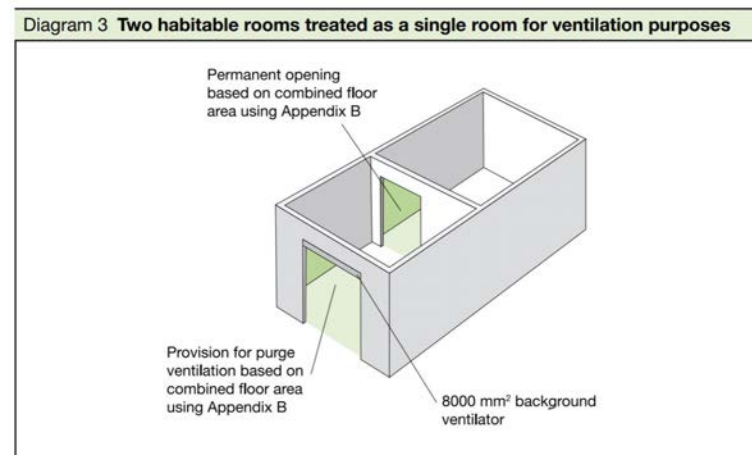


Fig.75
Approved Document F: Ventilation
Ministry of Housing, Communities and Local Government, The Building Regulations, 2010

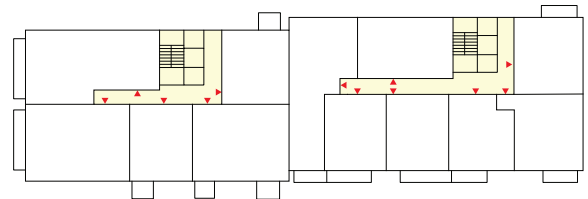
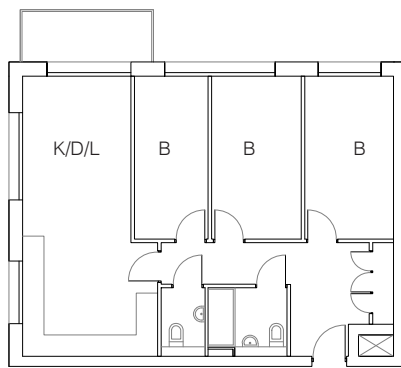
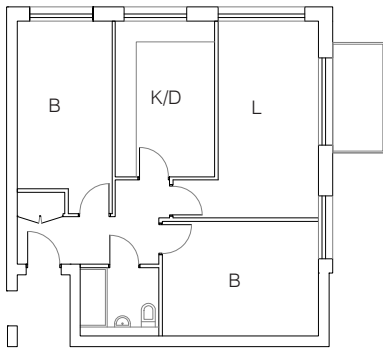
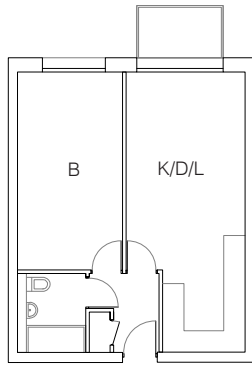
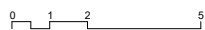


Fig.76
Mixed Floor Plans
1, 2 and 3 Bedroom Flats, Woodberry Down Estate (Regeneration), 2009
Hawkins\Brown Architects



Conclusions: Housing Typologies

The analysis of historical changes in building and dwelling typologies highlights the relationship between their formal layout and socio-cultural and historical contexts, technological advances, and environmental factors. Shaped by housing standards and building regulations, it reveals why and how the design of dwelling typologies has adapted to new needs and circumstances, and the spatial reasoning and evidence that has underpinned the decisions of policymakers and architects. Yet, many building and dwelling typologies remain strongly rooted in their historical origins, requiring a rethinking of how current social expectations and technical reasoning are to inform the design of housing.

The development of dwelling typologies demonstrates the significance that spatial hierarchy and organisation have within the home. Shifting perceptions of social status to efficiency, convenience, and privacy can be seen in the changes to the size, function, and presence (or absence) of certain spaces that have directly influenced housing layouts. An example of this is the disappearance of the parlour in interwar homes or the post-war overlap of functions in open-plan dwellings. Another is the birth of the hall in the nineteenth-century due to growing concerns with privacy, which replaced the previously popular enfilade. These ‘thoroughfare rooms’ were now regarded as inconvenient, as Robert Kerr stated in *The Gentleman’s House* (1864), as halls could both link and separate rooms.¹⁴⁶ This meant a change that, as Robin Evans claimed, was fundamental to change domesticity by defining a new spatial hierarchy of rooms and the social organisation and pattern of life at home.¹⁴⁷

146.
Evans, p. 63.

147.
Ibid, p. 64.

The transformational drivers of some purpose-built housing typologies are deeply rooted in social aspirations and necessities to function or appear like a house. The semi-detached house, for example, was a compromise between affordability and the status and independence of living in a detached house. Likewise, the maisonette was to provide family dwellings with benefits similar to that found in a house, while achieving higher built densities. In contrast, the purpose-built cottage flat as a response to widespread house sharing in Victorian times was far more modest and more like a flat despite its outside appearing like a typical terraced house. As the study of two- and three-storey houses shows, the scaling down of larger terraced houses to worker's cottages led to a simplification of spatial hierarchies and, together with changes in household composition and size, permanently altered the association of rooms with certain functions.

Changes in dwelling typologies and use are not always linear. Different occupancies, new use patterns, and user adaptations had a significant influence on dwelling layouts. Many purpose-built dwellings are occupied differently than originally intended and planned. Even today, this is still common in London, with living rooms used as a bedroom in shared households. Many of these transformations indicate an imbalance in household sizes and dwelling stock, and a failure of formal planning to address this. According to the English Housing Survey 2018–19, newer homes are not smaller than older homes, but rather older dwellings are more likely to have been converted or extended since their original construction.¹⁴⁸ Through small changes or larger conversions, these modifications have effectively led to a change in dwelling typologies within the same building – demonstrating a disconnect between dwelling and building typology. House conversions have been common since at least 1871 when Banister Fletcher proposed model plans for adapting existing terraced houses into flats. But often these subdivisions were done by individuals in less formal ways.

The mismatch between dwelling size, function, and occupancy comes as no surprise, as England has one of the oldest housing stocks in Europe, with 37% of its dwellings – and 56% in inner London – built before 1945.¹⁴⁹ Most of these older dwellings have undergone major alterations since they were first built, and today one in every five flats in London is the result of a building conversion. Flats in London represent 53% of all dwellings, which are made up of purpose-built flats (38%), converted flats (13%), and flats created by a change of use of former commercial buildings (2%).¹⁵⁰ While this can be problematic to effectively regulate housing quality and standards, these transformations also reveal the flexibility of building typologies in adapting to changing use and needs. While constrained by bye-laws and a rigid building line or front boundary, terraced houses can be extended by a rear extension, be given additional storeys, or subdivided into flats.

148.
Ministry of Housing, Communities & Local Government, *English Housing Survey 2018-19: Size of English Homes* (London: Ministry of Housing, Communities & Local Government, 2019), p. 1.

149.
Valuation Office Agency, 'Dwellings by Property Build Period and Type'.

150.
Mayor of London, *Housing in London 2014* (London: Greater London Authority, 2014), p. 17.

From Unit Scale to Building Scale

Building typologies have a specific relationship between the scale of the unit, the building, and its surrounding context and to access and circulation types. However, across dwellings with different numbers of floors, there are similarities between two building typologies. Dwelling units that consist of a ground floor and one or more upper storeys, such as houses, and those that are grouped in a building block of two storeys or more, such as flats.

In houses where access is typically through separate entrances from the street, their layouts are defined by a front and a back and a first- and second-floor level, in which privacy and functions have many gradients. Originally, the terraced house commonly had a socially representative 'public' room facing the front elevation of the building, while in contrast, many post-war houses switched the living room with the kitchen to gain more privacy. Even though the internal layout of one-, two- and three-storey dwellings can greatly vary in their internal arrangement of rooms in relation to the staircase leading to subsequent floors, the access to and circulation between buildings and dwelling units vary little.

Despite similarities in the layout and function of maisonettes and houses, with social areas located on the lower floor and the more private bedrooms on the upper floor, the building scale and access types of maisonettes can be distinct. Houses are commonly erected in rows parallel to a street, while the orientation of blocks of maisonettes is determined by that of the building. Having access galleries or internal corridors, maisonettes are in this respect organised more like flats at the building scale. Flats in high-rises tend to have internal vertical cores while in mid-rise buildings internal corridors or access galleries are common.

Households and Housing Stock

Household sizes, in distinction to family sizes, greatly diminished with the disappearance of resident domestic servants after 1939 and lodgers, who were still common in many households until 1960. At the start of the twentieth century, the average household size in the UK was around 4.5 people, but by the mid century, nearly two-thirds of households contained only 3 people or less. Since then, the decline has been more gradual, from 2.91 persons per household in 1971 to the present-day average of 2.4.¹⁵¹

The *County London Plan* (1943) and the *Housing Manual* (1944) encouraged housing schemes with a variety of dwelling typologies and layouts to cater to diverse and changing household sizes. In the County London Plan, Patrick Abercrombie and John Henry Forshaw proposed 'rehousing in terms of a mixed layout of housing and flats with the proportion of one to the other varying according to local conditions and requirements, thus producing a variety of treatment'.¹⁵² The priority was to increase density

151.
'Families and Households in the UK: 2017', Families, Office for National Statistics <<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2017>> [accessed 18 July 2020].

152.
Nicholas Bullock, 'Plans for Post-war Housing in the UK: The Case for Mices-Development and the Flat', *Planning Perspectives*, 2.1 (2007), p. 71.

using three density bands: 200 persons per acre (ppa) for central areas housed in seven- to ten-storey blocks of flats, a middle 136 ppa band with the majority provided by flats, and an outer 100 ppa band with half provided as walk-up flats of no more than three storeys. While the LCC focused on housing delivery over innovation, London's boroughs were increasingly interested in architectural experimentation and diversification of dwellings. But it was only in 1958, that Cleeve Barr from the LCC proposed a more systematic approach to dwelling typologies and use: large families requiring four or more bedrooms should live in houses, three-bedroom dwellings for families could be cottages or maisonettes, and smaller households should be accommodated in blocks of flats. While mixed-typology development created more housing variety, there was still the assumption that certain households such as larger families would be better off in houses and maisonettes. Historically, however, block dwellings and council flats in London have provided a whole range of housing sizes for all types of families.¹⁵³

153.
Glendining and Muthesius, p. 26.

In London, the majority of dwellings have two (30%) or three bedrooms (34%). However, in inner London, the tendency shifts to one- and two-bedroom dwellings, making up 30% and 32% of the housing stock respectively. This drastically shifts in outer London, with one-bedroom dwellings accounting for only 16% and dwellings with three-bedrooms or more making up over half of the housing stock (54%). This is unsurprising since semi-detached and terraced houses with two or more bedrooms are the main dwelling typologies found in outer-London suburbs.

This imbalance in bedroom distribution is exacerbated by changing household sizes and composition. In the UK, compared to 1939, there has been a significant rise in single-person households to more than a fifth of all households by 1981, and this tendency is growing.¹⁵⁴ However, London has the lowest proportion of single-person households (less than 25%) compared to other UK regions in 2019 (29.5%).¹⁵⁵ Despite this, London has the highest proportion of two or more unrelated adults sharing a household, 6.2% (206,000) compared to the UK average of 2.8%.¹⁵⁶ This means that even though inner London accounts for 30% of one-bedroom dwellings, these dwellings are largely unaffordable to many. Also, the lack of availability of one-bedroom dwellings in outer London makes it difficult to cater to one-person households or a household wishing to downsize.

There is thus a problem of housing affordability, availability, and suitability due to market dynamics that exacerbate over- and under-occupancy of housing. As suggested by the London Plan (2019 Draft), well-designed one- and two-bedroom units in suitable locations can attract those wanting to downsize from their existing homes, which can free up existing family-sized housing stock.¹⁵⁷ The distribution of dwellings according to the number of bedrooms highlights a mismatch of London's housing stock in relation to household compositions, occupancy rates, and demographics.

154.
Ravetz, *Place*, p. 13.

155.
Office for National Statistics,
'Families and Households in the UK:
2017'.

156.
Ibid.

157.
Mayor of London, *The Draft London
Plan - consolidated changes version*
(London: Greater London Authority,
2019), p. 5,

Typologies and Housing Standards

As the study shows, housing typologies and the policies that shape them are a consequence of political, economic, and cultural drivers that are historically contextual. If regulations and housing policies are part of larger governance and socio-political agendas, they should not be mere technical instruments isolated from social questions related to equitable access to decent homes. While a typological analysis can provide insights into how the built form relates to social transformations and hence the socio-spatial drivers of design, a systematic formal classification of dwelling organisation and the relation of its elements requires also a morphological study.

In Chapter 1, questions arose about the relationship between qualitative assumptions and a quantitative evaluation of housing. Historically, space standards and design guidelines have been greatly influenced by social norms but also by technological advancements. Moreover, while in some respects the *Parker Morris Report* was ahead of its time, the dimensions of rooms it recommended did not provide much flexibility to respond to changes in use, need, size, or preferences by households. Like previous reports such as the *Tudor Walters Report* and *Dudley Report*, the *Parker Morris Report* generalised needs and lifestyles and did only consider those that conformed with existing conventions.

For example, the *Dudley Report's* recommendations of a minimum of three bedrooms responded to the presumed need for individual privacy in a traditional family, promoting the extensive repetition and standardisation of dwelling layouts. The criteria determining these standards were thus based on the spatial hierarchies of the home defined by the functional management of the family. However, as Rob Imrie pointed out, 'housing quality, or people's experiences of domestic life and living, cannot be understood in isolation from the moral encoding or order of domestic design'.¹⁵⁸ The question is thus to what extent standards are housing quality safeguards but also socially normative and restrictive. For Matthew Carmona, standards therefore should support a strive for excellence in housing and not simply be about attaining minimum acceptable norms.¹⁵⁹ But, driven by dimensional and numerical criteria, space standards tend not to account for larger social concerns. In addition, quantitative measures are often informed by historical social aspirations whose architectural design solutions have become accepted conventions that are often repeated unquestioned.

However, diverse needs and uses are increasingly recognised, but difficult to regulate through standards, as these depend on the ability to generalise use and requirements. Some of the failures of current space standards have become especially apparent with the COVID-19 pandemic since 2020 and the drastic changes of home use it has led to. However, what this reveals is a new failure of standards but an exacerbation of existing housing inequalities, especially around size and amenities. As Julia Park notes, 'people tend to buy as much space as they can afford' and, therefore, the purpose of space

158.
Robert Imrie, *Accessible Housing: Quality, Disability and Design* (London: Routledge, 2006), p. 47.

159.
Matthew Carmona and Claudio de Magalhães, "Local environmental quality: establishing acceptable standards in England," *The Town Planning Review* 80, no. 4/5 (2009): p. 520.

160.
Julia Park, *One Hundred Years of Housing Space Standards: What Now?* (London: Levitt Bernstein, 2017), p. 11.

standards to ensure that affordable housing has sufficient space cannot address these problems on its own.¹⁶⁰ She adds that space standards are based on the basis that an adequate home is one able to function suitably when fully occupied. This must be understood in relation to changes in demographics, household size, and composition over time that have led to different modes of occupancy. The discussion of housing quality and minimum space standards has thereby moved from an idealistic and social to a functional housing approach characterised by notions of efficiency, privacy, and affordability.

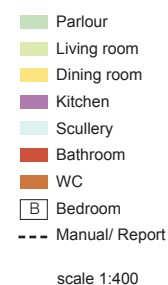
Today again a cyclical shift towards more qualitative assessment criteria of housing is apparent, linked to issues of wellbeing, social value, and, as the most recent housing report *Living with Beauty: Promoting Health, Well-being and Sustainable Growth* (2020) by the Building Better, Building Beautiful Commission demonstrates, ideas of aesthetics (beauty).

However, current housing policy also shows a fundamental disconnect between housing delivery, supply, and quality assessment from architectural design value, as regulations and standards rely largely on quantifiable performance requirements in which spatial design is often of diminished importance. In the transition from policy and regulations defined by public health concerns to user behaviours and more recently to less tangible aims such as sustainability, there has also been a shift from immediate design problems, such as designing 'healthy', meaning light, airy, spacious, hygienic, and well-equipped and serviced homes to creating houses that are an economic asset or have a more abstract social value. While design value and quality were directly visible in the architectural design or product of Victorian model dwellings and post-war modernist housing, this is no longer the case. Design and housing quality has become increasingly difficult to define. This raises the question of what role architecture and architects can play in housing innovation and transformations.

In addition, historically, most housing in London was not produced by architects but by speculative builders interested in cost savings through standardisation and low-risk investment, making housing a fundamentally conservative sector for investment. This was largely supported by building regulations and housing policies, raising the question to what extent housing design standards prevent design innovation.

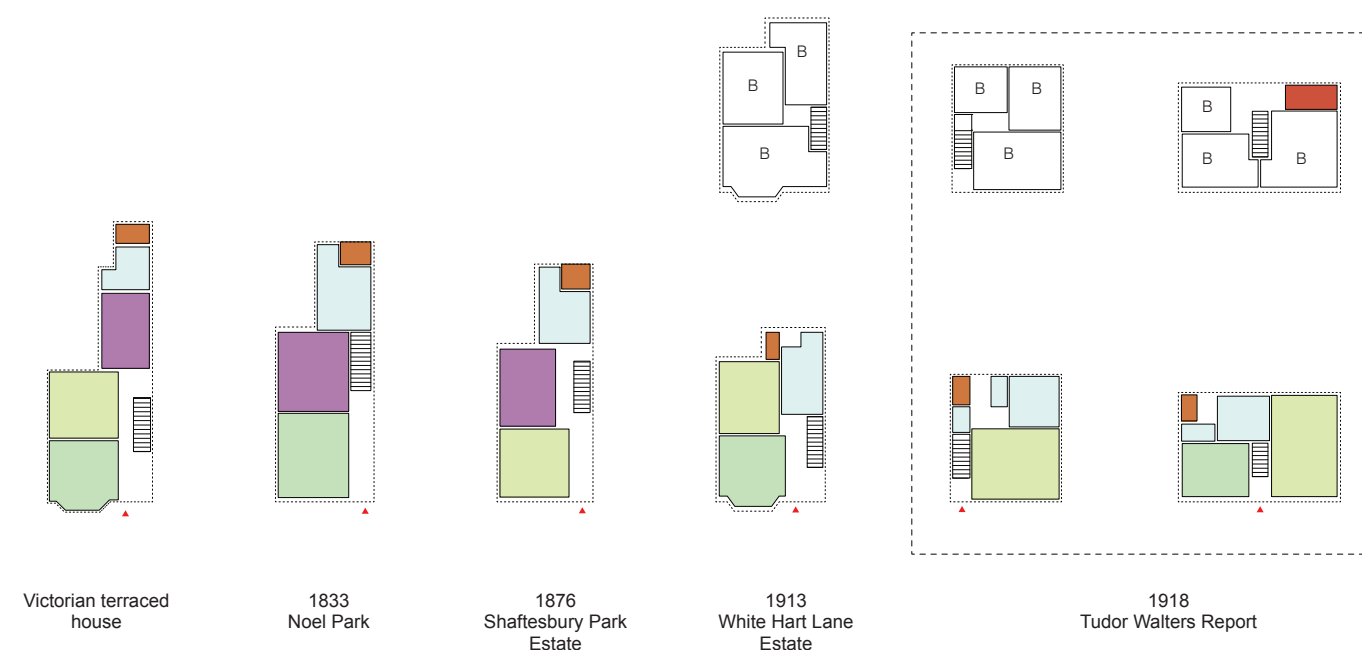
The Changing Design of Rooms

Two-storey houses and maisonettes



Victorian period

1920s



Victorian terraces typically had a rear extension that housed the kitchen, scullery, and WC while Georgian terraces or larger houses had their services located in the basement or mews. The scullery was for food preparation, washing up, and laundry, activities requiring the use of water. The kitchen was for cooking but also often for eating, and it was common for it to have a movable bathtub. Front and back rooms and the rear extension were accessed through a hall, and in cases when the back room was used for the kitchen, the scullery could be accessed through the kitchen.

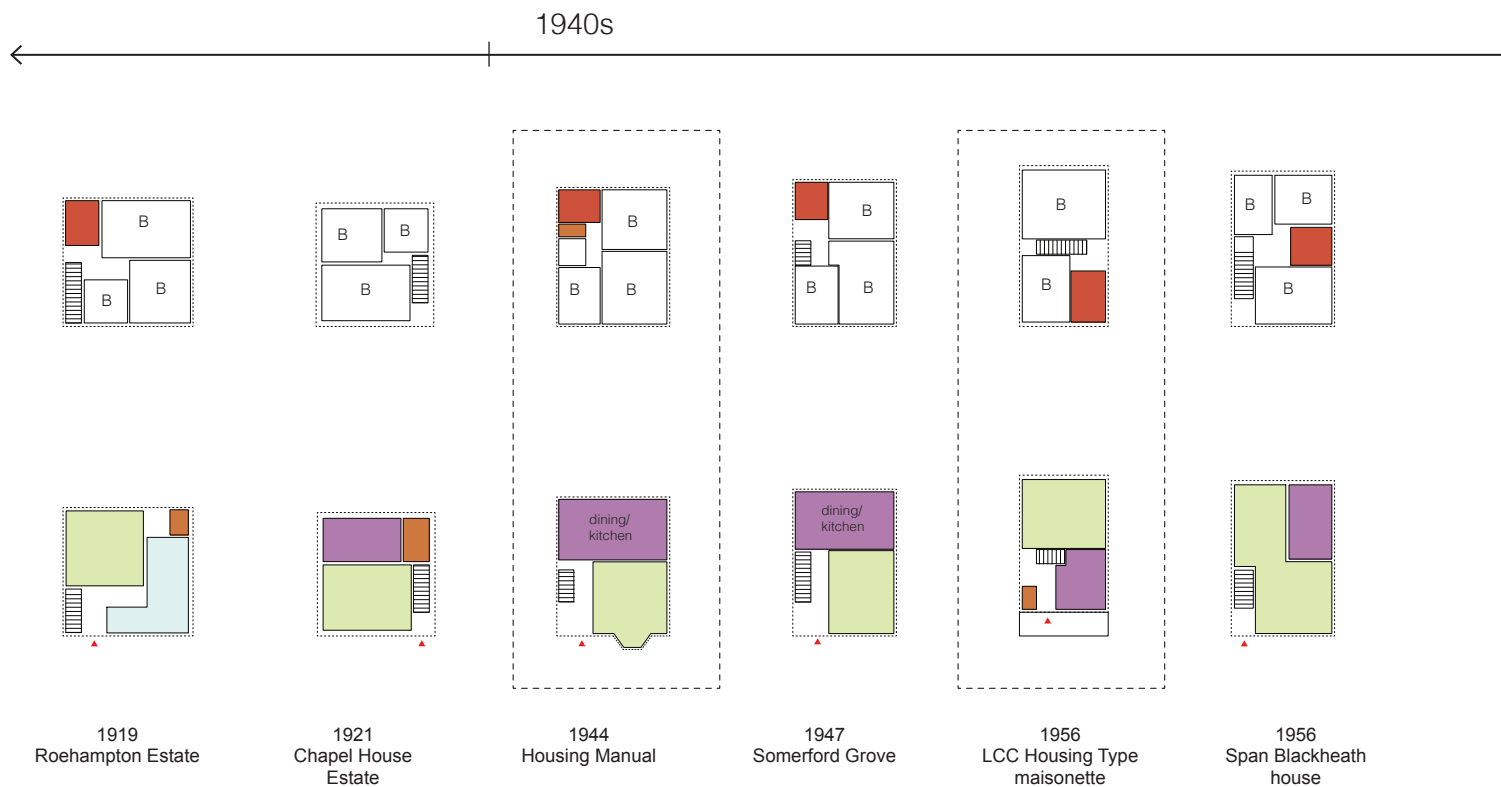
Houses with short rear extensions used this for the scullery, with a smaller extension attached to it for the WC, accessed from the outside. The kitchen was placed in the back room and also served for dining, while the front room provided a parlour or sitting room (e.g. Shaftesbury Estate, 1876, or Noel Park, 1833). The parlour was a room representative of social status, with larger houses having both a parlour and a sitting room.

In the twentieth century, the rear extension was eliminated or shortened (e.g. White Hart Lane Estate, 1933). This meant houses were built slightly wider than previously and the functions of the kitchen and scullery are combined. The WC was still placed at the back of the house but could be typically accessed from the inside.

The *Tudor Walters Report* (1918) proposed two layout types: non-parlour homes and larger homes with a parlour and living room. The report warned against narrow-fronted houses with rear extensions, recommending shorter terraces with wider frontage. Houses thus had either a scullery or a kitchen, although activities would overlap and some room names lost their conventional meaning and function. The ground floor WC was still in a separate compartment, but now accessible through the scullery/kitchen. In smaller non-parlour homes, the bath was taken in the scullery/kitchen in a zinc tub, while larger dwellings had a separate room on the first floor with a bathtub (bathroom).

The Changing Design of Rooms

Two-storey houses and maisonettes



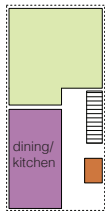
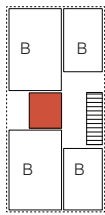
The transition to having the scullery/kitchen and WC inside the house created new layouts distinct from previous terraced houses (e.g. Roehampton Estate, 1919). In houses following the guidelines of the *Tudor Walters Report*, only large homes had a first-floor bath. Homes also had only either a parlour or a living room.

In 1944, the *Dudley Report's* recommendations and standardised plans of the Housing Manual promoted substantially larger kitchens at the back of the house with enough space for both cooking and dining. A large bathroom with a WC, washbasin, and tub was provided on the first floor with the bedrooms. It was also suggested that large homes should have both an upstairs bathroom and a downstairs WC.

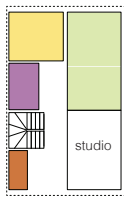
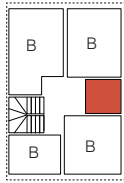
In post-war housing, the kitchen was typically placed to the front and the living room to the back for more privacy. This is especially common in maisonettes that have external access galleries running along the front. When kitchens were smaller, the dining and living room were in one combined space. Standard homes began to have an extra WC on the ground floor in addition to a first-floor bathroom.

1960s

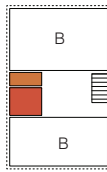
Today



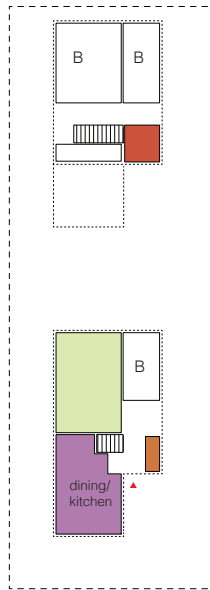
1959
Alton West



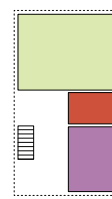
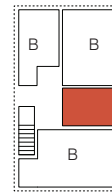
1970
Linden Grove



1972
Thamesmead
maisonette



1977
GLC Preferred Dwelling
Plans



2011
Anne Mews Housing

There were four typical layouts at entrance level: kitchen and dining room combined (e.g. Alton West, 1959), the living and dining room combined (e.g. Span Blackheath, 1956), a separate room for each function (e.g. Linden Grove, 1970), and an open plan proving living, dining, and cooking areas (e.g. Thamesmead, 1972).

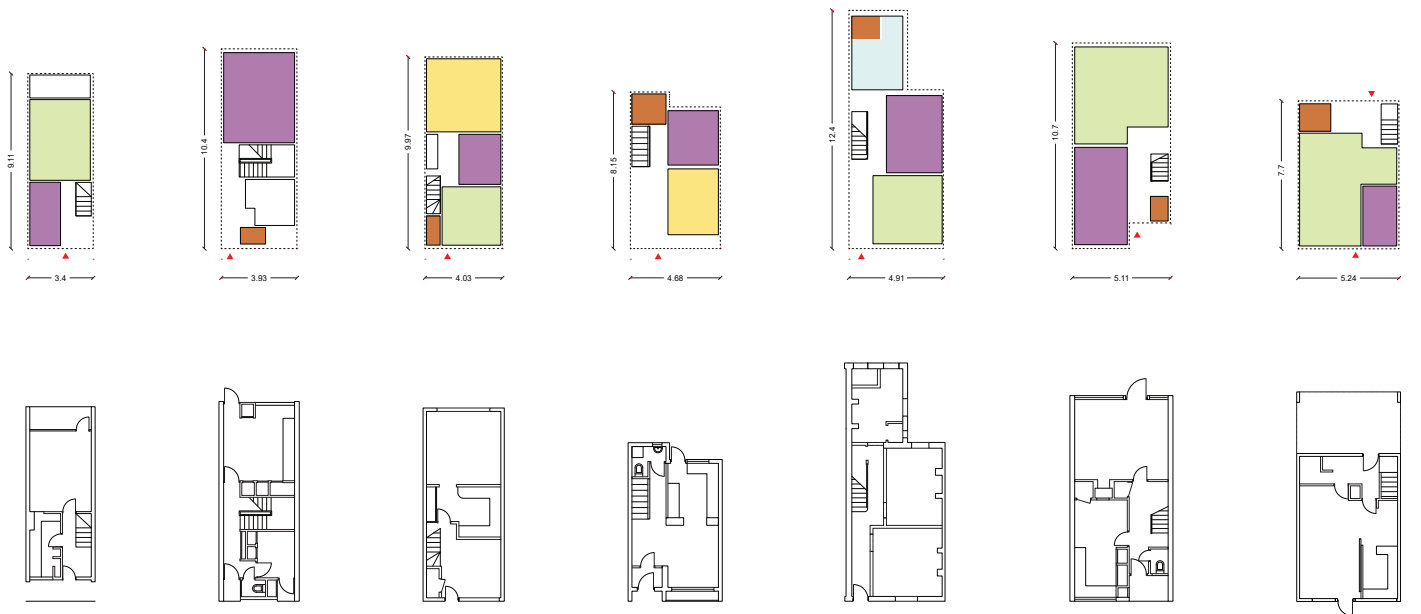
In housing designed according to the Preferred Dwelling Plans (e.g. Linden Grove, 1970), studios or bedrooms are placed on the ground floor. Having both a WC on the entrance level and an upstairs bathroom became mandatory.

Frontage width variation

Two and three-storey houses and maisonettes

Narrow

3m



2b
Two-storey maisonette
Churchill Gardens (1962)

3b
Three-storey house
Alton West (1959)

4b
Four-storey house
Chillingworth Road (2000)

3b
Three-storey house
Gore Road (1966)

3b
Two-storey house
Shaftesbury Park Estate (1876)

4b
Two-storey house
Alton West (1959)

3b
Two-storey maisonette
Thamesmead (1972)

- Parlour
- Living room
- Dining room
- Kitchen
- Scullery
- Bathroom
- WC

scale 1:400

Wide
7m



3b
Two-storey house
Somerford Grove (1947)

3b
Two-storey house
White Hart Lane (1913)

3b
Two-storey maisonette
Canada Estate (1962)

3b
Two-storey house
Ravenscroft Road (1964)

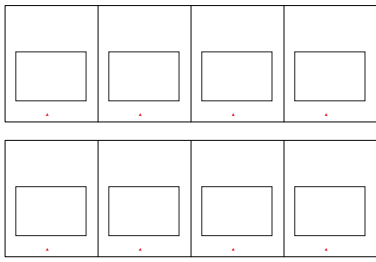
4b
Two-storey house
Linden Grove (1970)

4b
Two-storey house
Chapel House Estate (1921)

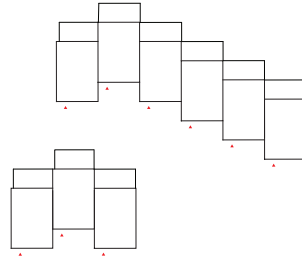
Among the main variations found in two- and three-storey dwellings is the proportion between width, depth, and height. However, the dimensions of terraced houses and maisonettes are mainly determined by the overall plot size and neighbouring units. A disproportionate depth, more common to period properties, is typically avoided to prevent a lack of natural light. Narrower houses and maisonettes have a well-defined front and back room, typically with a staircase and corridor to one side. Exceptions within narrow dwellings include three-storey houses such as Alton West (1959), in which the staircase is placed between the front and back room. Wider homes, such as White Hart Lane (1913) with 5.65 m or Ravenscroft Road (1964) with a 6.1 m frontage, can have double-aspect rooms or adjacent rooms. Less restricted by the building width, stairs can be placed parallel to the facade in wider homes.

Direct from exterior

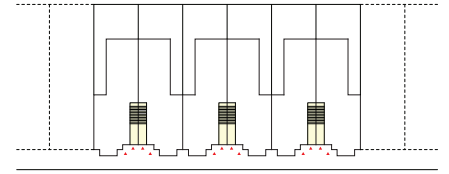
Single-storey dwellings



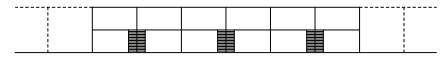
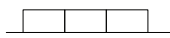
Excalibur Estate bungalows (1959)



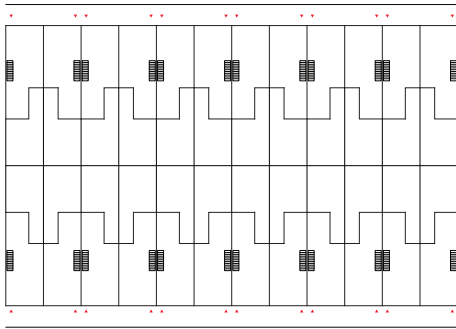
Alton West bungalows (1959)



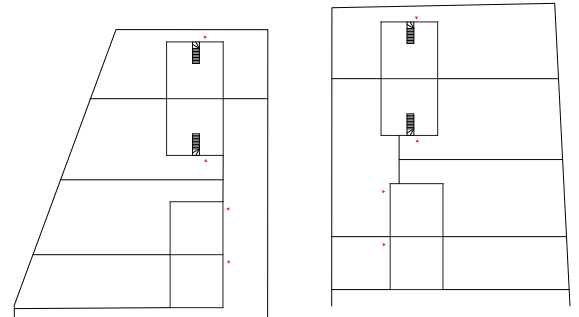
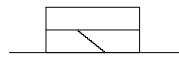
North Bank Road cottage flats (1905)



Two-storey dwellings

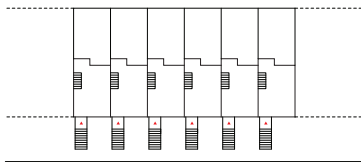


Shaftesbury Estate terraced houses (1876)

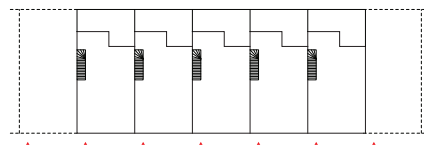


Chapel House Estate semi-detached houses (1921)

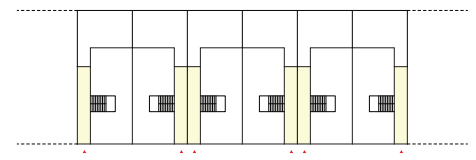
Three-storey dwellings



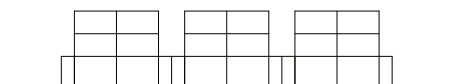
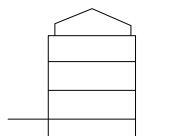
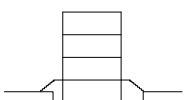
Gore Road (1966)



Gower Street (1789)

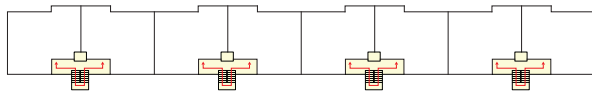


Princess Place (1790)



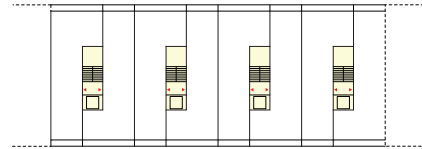
Direct from interior- in pairs

Single-storey dwellings



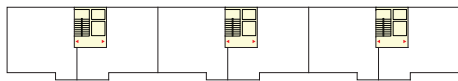
Churchill Gardens (1962)

01



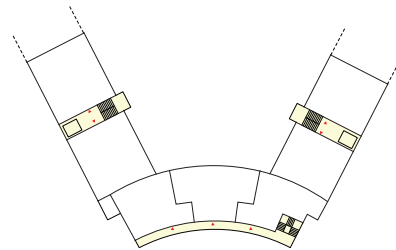
Barbican Estate (1976)

02



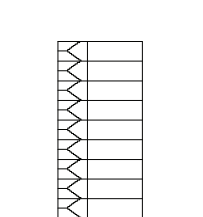
Bethnal Green Peabody Estate (1910)

03

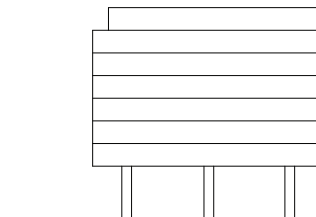


Church Street Estate (1937)

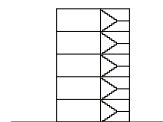
04



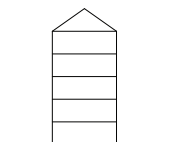
01



02

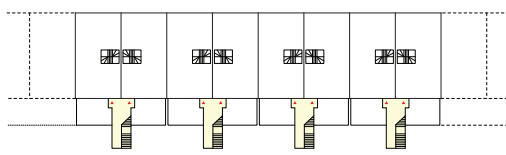


03

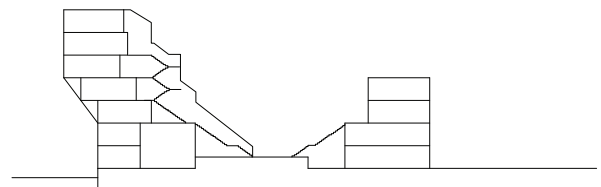


04

Two-storey dwellings



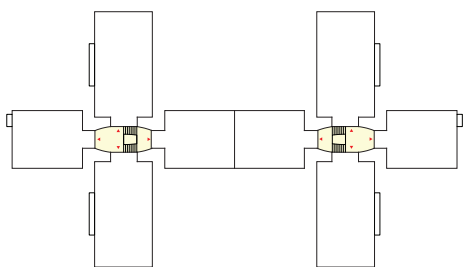
Alexandra Road Estate (1978)



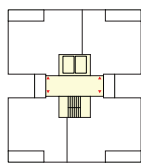
0 15

Direct from interior- multiple

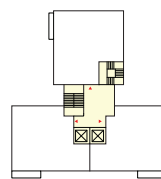
Single-storey dwellings



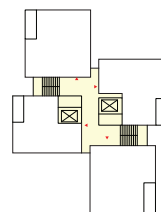
Highpoint One (1935)



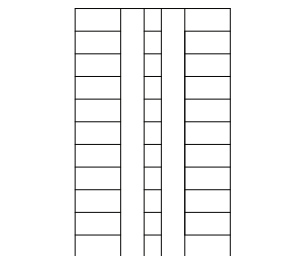
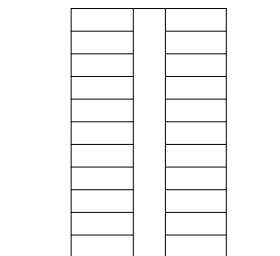
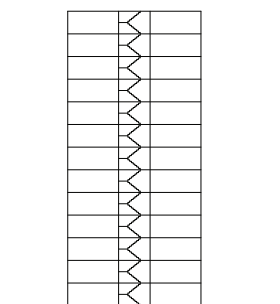
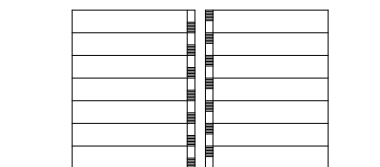
Thamesmead (1972)



Claremont Estate (1957)



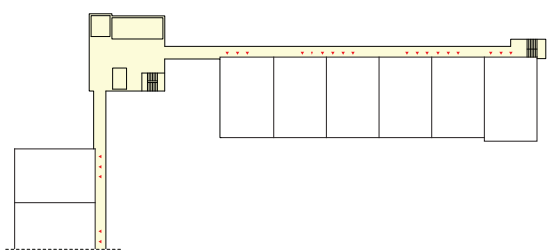
Myrterne Court (1954)



0 15

Internal access corridor

Single-storey dwellings

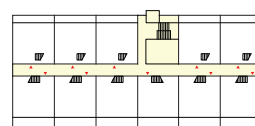
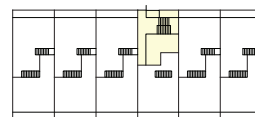


Trellick Tower (1972)

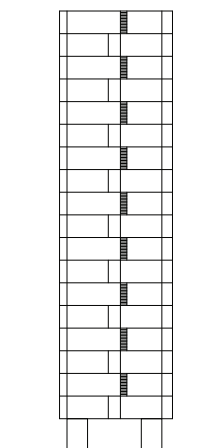
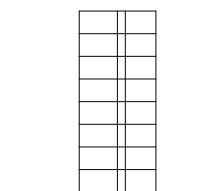
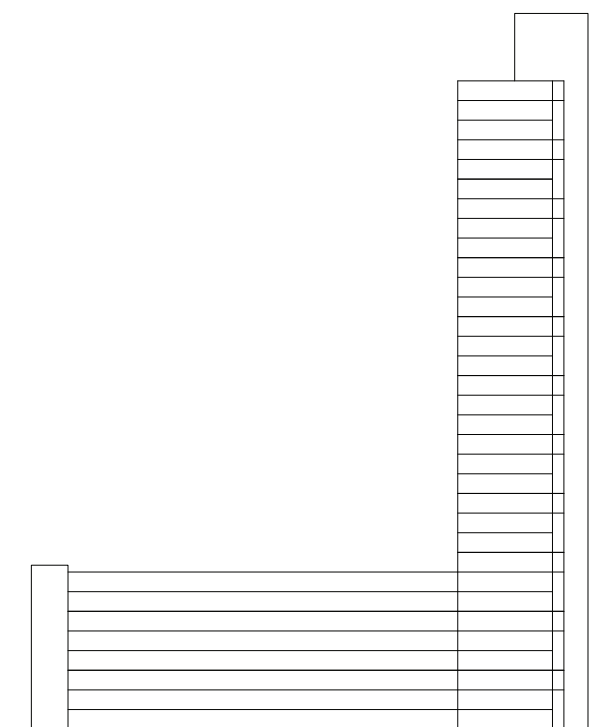


Woodberry Down (2009)

Two-storey dwellings

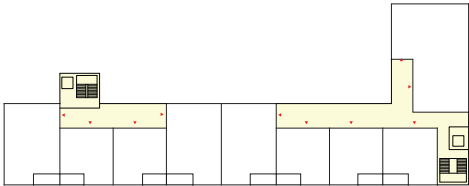
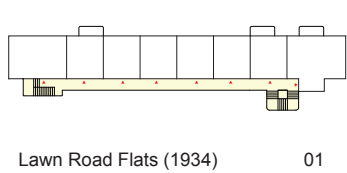


Lincoln Estate crossover
maisonettes (1960)



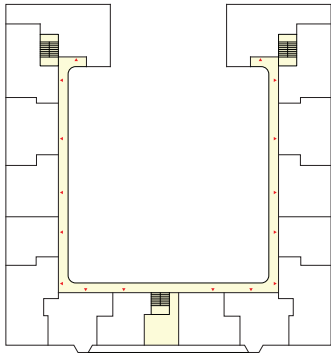
Exterior gallery access

Single-storey dwellings

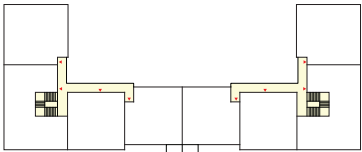


Lawn Road Flats (1934) 01

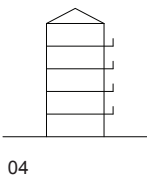
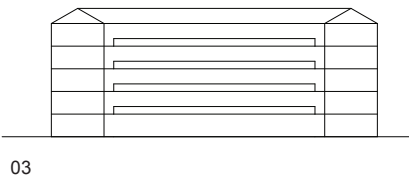
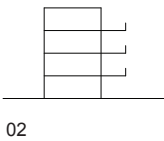
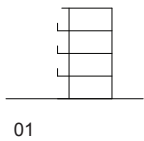
Tower Hamlets Community Housing (2004) 02



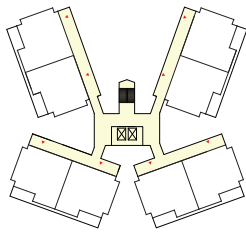
Kennington Estate (1936) 03



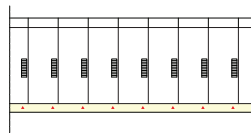
Richmond Grove (1936) 04



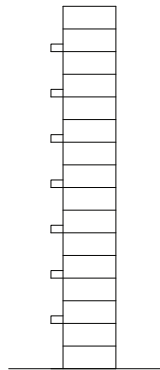
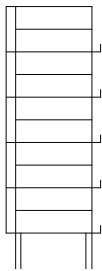
Two-storey dwellings



Kelling House maisonettes (1958)



Alton West maisonettes (1959)



Chapter 3:

Dimensional Data Analysis

Introduction

This chapter is a data-based and quantitative analysis of the housing stock in London. In contrast to the analysis in preceding chapters on how housing policy and dwelling typologies are related – which uses a typological and qualitative approach – this chapter examines differences and variations of housing design from statistical, dimensional, and morphological perspectives. It studies spatial dimensions in relation to changes in housing policy, space standards, and organisation and their impact on housing design. This will test commonly used typological housing descriptions and classifications to verify their value or limitations to housing analysis and how design decisions are made.

As the first two chapters show, a great deal of attention is paid to the dimensioning of dwellings to safeguard minimum space standards and assess if housing is ‘well-designed’ and ‘high-quality’, with what this means changing over time. Complemented by standard plans that are to be repeated or generic, typical plans – indicating a preferred or common design solution meeting design standards that can be interpreted – this interrelation between standards and standardised plans has reinforced typical dwelling unit layouts.

Based on 4,210 dwelling unit plans sampled from different London boroughs, we explore how the analysis of a large plan dataset provides new insights into housing design. We ask if this challenges or supports commonly held design assumptions that are often based on qualitative reasoning? In particular, this looks at if this changes the relationships between quantitative and qualitative criteria commonly underpinning housing evaluations, housing policy, and typological classifications?

There are several recent large-scale studies of housing plans in relation to home sizes and space standards. “‘What is the Average House Size in the UK’, Are Britain’s Houses Getting Smaller – New Data’ (2020) by the Local Authority Building Control (LABC) compiles open access data from property sites such as Rightmove and Zoopla. Analysing around 10,000 houses built in the UK from 1930 to 2010, it concludes that house sizes have gradually shrunk. While it finds that dwelling and average bedroom sizes are getting smaller, other rooms such as living rooms have increased. The average bedroom size reduced from 15.34 m² in the 1930s to 13.37 m² in the 2010s and the average three-bedroom dwelling decreased from 83.3 m² in the 1970s to 67.8 m² in the 2010s. Focusing on houses (flats are not included in the analysis), the study does not consider in its calculations the areas of hallways, stairs, and storage space, which have significantly changed over time (greatly differing between property types), with overall dwelling sizes derived by only adding up the main room sizes.

In 2014, Malcolm Morgan and Heather Cruickshank in ‘Quantifying the Extent of Space Shortages: English Dwellings’ compared 16,000 homes, taken from the English Housing Survey (EHS) 2010, to the space standards of the *London Housing Design Guide* (LHDG, 2010) by the London Development Agency. They find that 55% of homes in England are smaller than these standards. However, based on two different methods of calculating ‘adjusted’ dwelling sizes to compare EHS and LHDS dwelling sizes, there is an error margin of up to 8.5% in their adjustment that limits the certainty of their findings.

Other studies of housing standards include the report *Housing Space Standards* (2006) for the Greater London Authority by HATC, which looks at housing in London.¹ Concerned with how new-built dwellings are getting smaller, it finds that 57% of total combined bedroom areas and 63% of combined living areas (kitchens, dining, and living room) are smaller than the minimum internal dwelling areas stipulated in the *Building Research Establishment’s Housing Design Handbook* (1993) and the National Housing Federation’s *Guide to Standards & Quality* (1998). However, their sample size is too small to make wider generalisations (38 dwelling units from five estates).

1.
For a detailed discussion of space standards in London see, Commission for Architecture and the Built Environment, *Housing Standards: Evidence and Research* (2010); and Greater London Authority, *Housing Design Standards: Evidence Summary* (2010).

Study Data

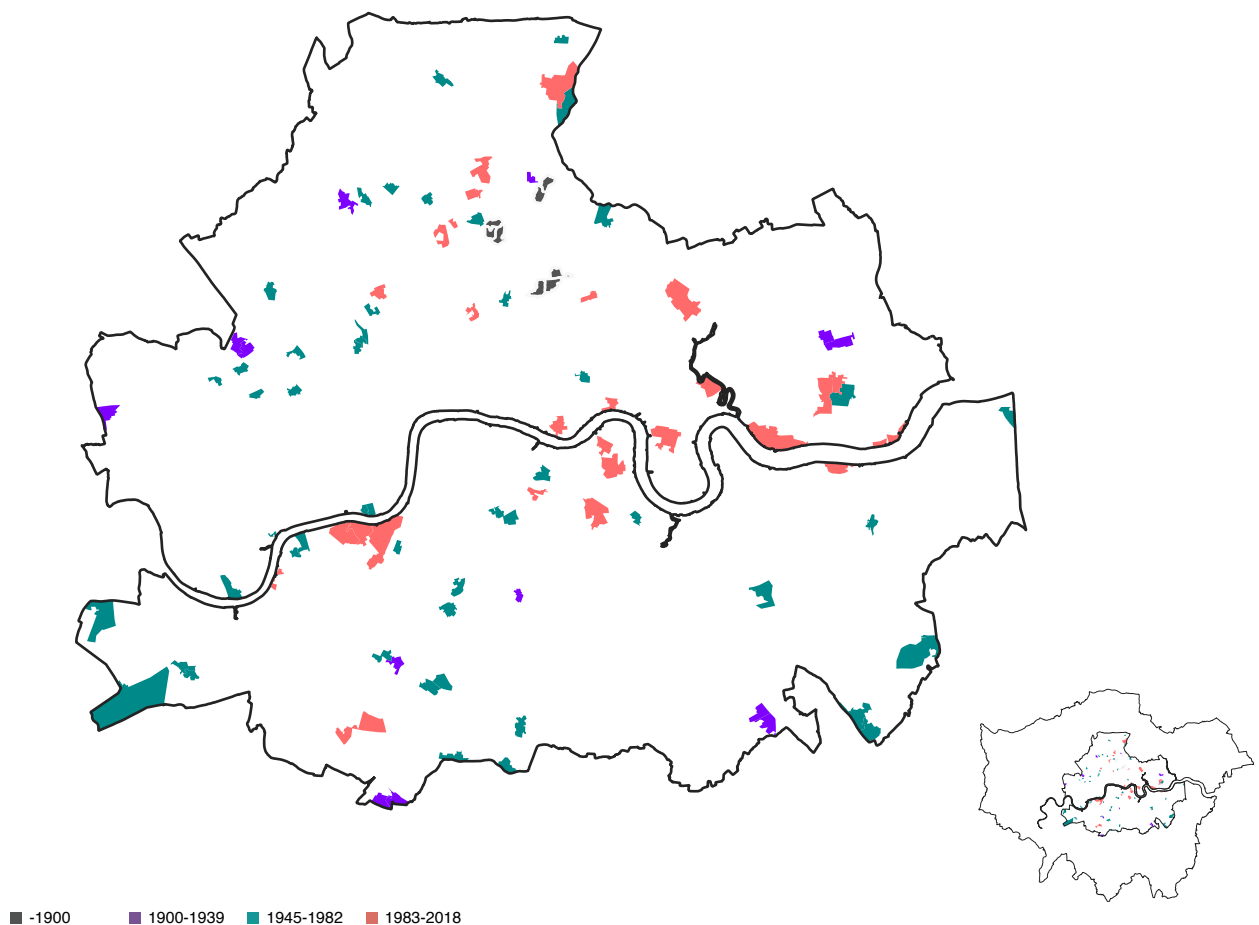


Fig.1
Sampled LSOAs

The dwelling unit plans for this study were sampled from twelve inner London boroughs (Camden, City of London, Greenwich, Hackney, Hammersmith and Fulham, Islington, Kensington and Chelsea, Lambeth, Lewisham, Newham, Southwark, Tower Hamlets, Wandsworth, and Westminster). A purposive sampling method was used. A random approach that would have reduced selection bias was not possible due to the insufficient availability of address and building-level data.

The sampling criteria were areas with housing built in different periods and the number of bedrooms in a dwelling. Disregarding during the initial selection the property type classification commonly used in government statistics, permitted a direct comparison of dwelling sizes across different building typologies with similar morphological characteristics, which are conventionally treated as separate by architects and in most previous studies (e.g. house compared to a maisonnette).

Sampling of Dwelling Unit Plans

First, areas for sampling were selected from the Lower Layer Super Output Areas (LSOA) – the smallest standardised geographical units used in government statistics, which contain 400 to 1,200 households each.² Sampling at LSOA level enabled the dwelling plan dataset to be directly compared to other government statistics such as demographic information on households. In particular, two statistics published by the Valuation Office Agency (VOA) on property tax bands that include the property built period, property type, and bedroom count of the housing stock at LSOA level were used.³ VOA statistics are published for the property built periods: pre-1900, 1900–1919, 1920–1929, 1939–1939, 1945–1954, 1955–1965, 1966–1972, 1973–1982, 1983–1992, 1993–1999, 2000–2009, and 2009–2018. Based on this data, areas with a large number of housing built in the same period – representing a minimum of 60% of total housing in a specific LSOA – were chosen (see Appendix A). The selected areas were then ranked according to the number of dwelling unit plans available from the online services of the relevant planning departments. We considered if areas have a high repetition of property types and therefore of dwelling plans, as areas with a high proportion of the same building or dwelling typology and plan justify a lower sample size. At the same time, especially for dwellings built before 1919, a bedroom count (1, 2, 3, 4+ bedrooms) was used for further differentiation, as although predominantly built as houses, they have often been subsequently converted (usually into flats and maisonettes) and therefore their current plan layouts and property type classifications differ from when they were originally built.⁴ Thus, the VOA property types (bungalow, flat and maisonette, terraced house, semi-detached house, and detached house) were less useful for the analysis. Following this, 108 LSOAs were identified as meeting the basic sampling criteria (Fig. 1).

Using historical ordnance survey maps, spanning from the 1840s to 1990s and Google Maps satellite images, the 108 LSOAs were analysed to verify the extent of repetition of building typologies and to ensure that different building typologies within the same property built period typical for the area are included in the dataset. In comparison to other inner London LSOAs, the selected areas thus represent those with the greatest repetition of building typologies. Because of this, the LSOAs also represent dwelling types and layouts common for a specific period as discussed in the previous chapters. Generally, housing sampled from a specific period indicate a predominant building typology: terraced houses for the period before 1939, housing estates with repetitive blocks of flats and maisonettes for housing built between 1945 to 1982, and flats in larger housing developments are found in the period after 1983, such as the regeneration schemes for the Docklands. While these often correspond to a repetition of dwelling types, this is not always the case, as the buildings might have been converted or extended, especially in areas with old terraced houses. To ensure that dwellings built in the same period but changed since are included in the sample, the number of bedrooms was used in addition (See Appendix A). Due to the repetition of dwelling types

2. See 'Super Output Area (SOA)', Census Geography, Office for National Statistics <<https://www.ons.gov.uk/methodology/geography/ukgeographies/censusgeography#super-output-area-soa>> [accessed 26 July 2020].

3. Valuation Office Agency, 'Number of Properties by Council Tax Band, Property Build Period and Region, County, Local Authority District and Lower and Middle Super Output Area' and 'Number of Properties by Council Tax Band, Property Type and Region, County, Local Authority District and Lower and Middle Super Output Area', in Council Tax: Stock of Properties, 2018, tables CTSOP 3.1. and CTSOP 4.1. [last updated 29 November 2018] <<https://www.gov.uk/government/statistics/council-tax-stock-of-properties-2018>> [accessed 27 July 2020].

4. According to VOA statistics from 2010, dwellings in converted buildings built before 1919 (categories 40–48) constitute 19.49% of the total housing stock, whereas the total number of buildings built before 1919 constituted 42%. This means that by 2010, almost half of the dwellings built before 1919 were converted into houses and maisonettes.

and building typologies, a smaller sample could be taken to represent a greater number of similar dwellings.

After selecting the LSOAs, building typologies, and property types for sampling, dwelling unit plans for a total of 4,210 homes were collected. These were taken from both the respective borough's online services of the planning department including from the Greater London Authority (in cases of large-scale housing regeneration schemes) and the UK's largest online real estate website Rightmove (rightmove.co.uk).⁵ This provided 1,482 dwelling unit plans for the years before 1939 and 1,418 for after 1982 collected from planning departments. For the properties built from 1945 to 1982, an additional 1,310 dwelling unit plans were collected from Rightmove.

5.
For the areas built between 1945 and 1982, only a very limited number of plans were available from the online services of the planning departments.

For 10% of the housing built before 1939, which are predominantly terraced houses, we have included both the 'existing' and the 'proposed' set of plans that formed part of the planning application and were granted approval by the local councils. The 'approved' plans represent a building alteration – typically a subdivision into several dwelling units and sometimes an extension. The 'existing' plans were only included if these were of the original building layout, which was confirmed by comparing it to similar dwellings in the street to determine whether or not the layout had been altered.

We considered housing plans of dwellings built after 1983 – predominantly flats taken from planning applications for larger housing estates – as type-plans (typical unit plans that are repeated within a housing development). As these are flats in larger buildings and developments, we assumed that due to physical and legal constraints these have usually not materially changed in their layout. Therefore, while a smaller sample of plans was collected from areas developed after 1983, they represent a greater number of dwellings with identical layouts.

Our purposive sampling by LSOA and built year produced results similar to comparable studies. However, the dataset included only large developments. As these tend to be developed for the higher-end private market, the dataset is limited in lower-end private-sector housing examples.

Data Conversion

The 4,210 collected dwelling unit plans were converted into their dimensional and numerical data using machine learning algorithms provided by Archilogic and Archilyse (3,026 dwelling units) and XCYDE (1,184 dwelling units).

A comparison of 30 randomly selected dwelling unit plans each from data converted by Archilogic/Archilyse and XCYDE to the originally sampled floor plans showed that there was little dimensional divergence between converted and original data. For 75% of the compared rooms, the difference was less than 0.3 m² and the overall average 0.48 m². Only a few floor plans differed more than 1 m², which were subsequently eliminated from further analysis (Fig. 2).

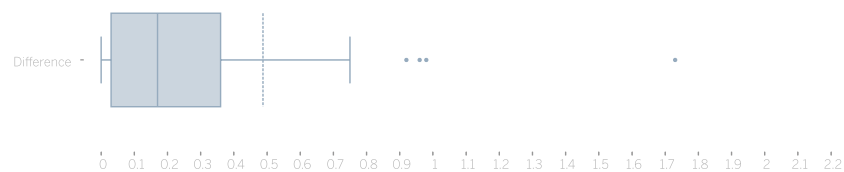


Fig. 2
Distribution of dwelling size differences between study data and the original plans they are derived from.

The data points collected for each sample included:

- For each room: net floor area, dimensions of the minimum bounding box⁶, circumference, existence of windows, kitchen, and bathroom elements, staircases, and the number of doors.
- For each floor: net floor area and dimensions of the minimum bounding box.

From the converted data, some floor plans had to be eliminated as not all required data points were accurately extracted from the base data (images of vectorised drawings of floor plans and, in some cases, vectorised plan information). For example, in the case of multi-storey dwellings, the whole set of floor plans was excluded whenever a plan was missing.

We also found a few cases with exceptionally large or small dwelling sizes (total net floor area) in comparison to other housing in the same LSOA. This resulted from either an incorrect scaling of floor plans or the inclusion of balconies, gardens, and terraces in the total floor area calculation. Where the scaling was incorrect, the plans were omitted from further analysis. Where the automatic labelling of rooms was wrong, we manually corrected the labels and recalculated the internal floor areas. In total, we eliminated 1,707 dwelling units from our initial dataset of 4,210 using 2,503 for further analysis (Table 1).

6. Overall short and long side of plans along the x- and y-axis, with plans aligned to face up on paper space.

Data Provider	Collected	Analysed	Eliminated			
			Data Conversion		Analysis	
			Illegible Plans	Missing Plans	Illegible Plans	Scaling / Outliers
Archilyse	3026	1661	463	384	250	268
XCYDE	958	842	32			84
Total	4210	2503	495	384	250	352

Table 1
Nationally Described Space Standards adjusted for habitable room and dwelling typologies used in the analysis

Data Labelling

For each floor plan, rooms were automatically labelled during the data conversion (Fig. 3). A ‘room’ was defined as a space bounded and separated from others by walls and connected by doors. Rooms separated from each other by openings other than doors were counted as one room (e.g. connected living and dining areas or an entrance area open to a living room). Built-in storage, which meets the criteria of a ‘room’ (enclosed by walls and separated by a door), was counted as a separate room in the raw data but later merged with the room it connects to if its floor area was less than 1.5 m². We checked the plans in which this problem occurred and determined that the 1.5 m² threshold was suitable to distinguish built-in storage reliably from other rooms.⁷

To label the dwelling plans, the following criteria were used:

- Any room with bathroom elements was given the label ‘bathroom.’
- Any room with kitchen elements was labelled ‘kitchen.’
- Any room without a window was labelled either as ‘storage’ or ‘circulation’. To distinguish between these two labels, we used the criteria of:
 - Number of doors
 - Room shape (width/length ratio, compactness ratio⁸)
 - Floor area
- Any remaining rooms with windows were labelled ‘habitable room’, except:
- A room smaller than 4 m² was labelled as ‘storage’ (applying a floor area criteria, Fig.3).⁹
- A room with a compactness ratio less than 0.4 was labelled ‘circulation’ (using a compactness ratio criteria).

7. The 1.5 m² threshold is determined by iteratively trying different threshold values and manually comparing the label to the original floor plans. While there was built-in storage larger than 1.5 m², they were subdivided into smaller storage areas, never exceeding 1.5 m².

8. A compactness ratio was used to analyse the footprint shape, calculated by dividing the net floor area of the ground floor plan by the area determined by the bounding rectangle of the dwelling, drawn from the points of its greatest width and length.

9. The 4 m² threshold is determined by trying different threshold values between 4 m² and 8 m². 8 m² is the single room standard in *London Design Guide* (2010) and *Nationally Described Space Standards* (2015). Karn and Sheridan (1994) noted that rooms as small as 4 m² were accepted as bedrooms in the 1990s. Filtering the rooms below 8, 7, 6 and 5 m² thresholds and looking at the original floor plans showed that these rooms could be used as bedrooms as they could fit a single bed. However, rooms smaller than 4 m² returned a significantly smaller number of rooms (n = 32) and were more likely to be used as storage or utility rooms based on their location, e.g. entrance, next to bathrooms and kitchens.

10. 21 m² (9.4 m² for kitchen and dining, 12 m² for living) is the minimum combined kitchen, dining, and living area stipulated by the *London Design Guide* (2010). The thresholds of 14 m² and 18 m² are based on a study of kitchen sizes, types, and unit usability with a smaller sample of dwellings with a kitchen and a habitable room (n=155) and dwellings with a kitchen and two habitable rooms (n = 316). Starting from the smallest kitchen sizes, the floor plans were compared, determining 18 m² as the minimum size for combined kitchens and living areas based on their capacity to fit furniture and kitchen counter size and location, and 14 m² as a threshold separating studios from one-bedroom units (18 of such dwellings had a kitchen size between 14 m² and 18 m² and 6 of them had kitchens smaller than 14 m², 90% below 7 m²).

- To distinguish a ‘habitable kitchen’ (combined kitchen-dining, kitchen-living, or kitchen-dining-living) from those solely used as a ‘kitchen’, we applied the following criteria:
 - If there was only 1 room in total in the dwelling (excluding bathrooms but including the room with the ‘kitchen’), it was labelled a ‘habitable kitchen’.
 - If there were 2 rooms in total in the dwelling (excluding bathrooms), the room with the ‘kitchen’ was labelled a ‘habitable kitchen’ if it is equal to or greater than 14 m².
 - If there were 3 rooms or more in total in the dwelling (excluding bathrooms), the room with the ‘kitchen’ was labelled a ‘habitable kitchen’ if it is equal to or greater than 18 m² (Fig. 4).¹⁰



Fig. 3
Floor Plans with 4 m² Habitable Rooms



Fig. 4
Examples of habitable room and kitchen labels.

Kitchen / Habitable Kitchen
 Primary Room
 Secondary Room

Data Analysis

The preceding two chapters of this housing study have shown that dwelling size is a key assessment criterion informing housing policy, regulations, and standards for over a hundred years in the UK. Key dimensions such as minimum bedroom widths, albeit seemingly secondary, are important to determining space standards, housing layouts, and usability. For example, while the minimum size of a three-bedroom dwelling has seen fluctuations within the range from 58 to 95 m², the minimum first (main) bedroom size steadily decreased from 14.5 m² in 1919 to 11.5 m² in 2015. This means that over time, floor areas were distributed differently across rooms according to changes in dominant dwelling typologies and lifestyles favoured in different periods.

Space standards are based on functional requirements, with minimum room sizes determined by the space required for the placement and use of standard furniture deemed essential for a room's usability (often defined by a required furniture schedule). To study these quantitative criteria in greater detail – with furniture and activity zones having become indicators of dwelling usability and functional requirements – we analysed the dataset using four key aspects: (i) net dwelling floor area, (ii) dwelling dimensions, (ii) net room floor areas, and (iv) room dimensions. These four aspects were compared against another three variables: (v) number of habitable rooms (HR), (vi) dwelling typology, and (vii) built year periods.

Dwelling units were first grouped according to their number of habitable rooms (1, 2, 3, 4, 5, 6 rooms) and their dwelling typology (which was defined in this analysis as single-, two-, and three-storey dwellings). Grouping

according to the number of floors is consistent with the classifications used in space standards such as the Nationally Described Space Standards of 2015 (NDSS) and the definition used in the preceding Chapter 2 (Table 2). Dwellings with more storeys and dwellings with more habitable rooms in the dataset were eliminated from our analysis as the sample sizes were comparatively smaller (57 units).

Built year periods can be analysed in relation to the housing policy, regulation, space standards in place at the time – a discussion detailed in the first two chapters – and in regards to dominant property types in these periods. Built year periods and dwelling typology are the primary criteria used to compare the four aspects of analysis (dwelling floor area, dwelling dimensions, net room floor area, and room dimensions). The habitable room (HR) count was taken as secondary criteria to further distinguish and compare data for the same built year period and dwelling typology. However, dwelling typologies and built year periods are not completely independent from each other. While 58% of multi-storey dwellings were built before 1945, the majority of flats were built after 1945 (91% of all flats sampled).

HR	Dwelling Typology	Lowest	Highest
1	One-storey	37	50
2	One-storey	37	50
2	Two-storey	58	59
3	One-storey	61	70
3	Two-storey	70	79
4	One-storey	74	95
4	Two-storey	84	102
4	Three-storey	90	108
5	Two-storey	44	52
5	Three-storey	103	130
6	Three-storey	116	134

Table 2
Nationally Described Space Standards adjusted for habitable room and dwelling typologies used in the analysis

Dwelling Size and Number of Habitable Rooms

The size of dwellings was analysed, with Graph 1 showing the distribution of total net floor areas in relation to the number of habitable rooms (HR). The distribution of dwelling sizes and their mean (dashed line) were compared to the applicable range of the current Nationally Described Space Standards (grey zone). The majority of our sample is made up of dwellings with two (638), three (969), and four (506) habitable rooms. There was a comparatively small number of dwellings with one (79), five (218), and six (36) habitable rooms.

Graph 1 shows that dwelling sizes have a wide range. With an increase of habitable rooms, the floor area range of dwellings with the same number of habitable rooms generally increases significantly in square metres. Dwellings with one habitable room have a floor area of 19 m² to 67 m², a 48 m² difference. Those with two habitable rooms vary from 25 m² to 96 m², a 71 m² difference. Dwellings with three habitable rooms measure between 33 m² to 115 m², an 82 m² difference. The largest dwellings have 3 to 3.9 times the size of the smallest ones with the same number of habitable rooms. Dwellings with four to six habitable rooms show a smaller but still significant difference in size of around 1.5 times. Dwellings with four habitable rooms range from 52 m² to 140 m², a 117 m² difference, and with six habitable rooms they range from 112 m² to 225 m², a 113 m² difference.

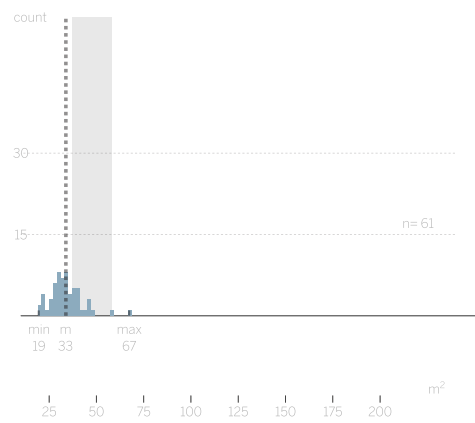
Dwelling sizes generally follow a curve that rises to the mean and then sharply drops. In dwellings with one, two, three, and four habitable rooms, the mode largely corresponds to the mean dwelling size for each category but tends to be slightly below. While dwelling sizes have large ranges, the mean dwelling sizes are always closer to the lower end of the range and also to the relevant space standards. The mean floor areas are 34 m² for 1HR, 47 m² for 2HR, 67 m² for 3HR, 87 m² for 4HR, 107 m² for 5HR, and 147 m² for 6HR dwellings.

Overall, 37% of the sample is below the Nationally Described Space Standards (NDSS, 2015). However, almost half (44%) of common dwelling types, 3HR, 4HR and 5HR, fail space standards. The figure is 70% for 1HR, 17% for 2HR, and 5% for 6HR dwellings (Table 3).

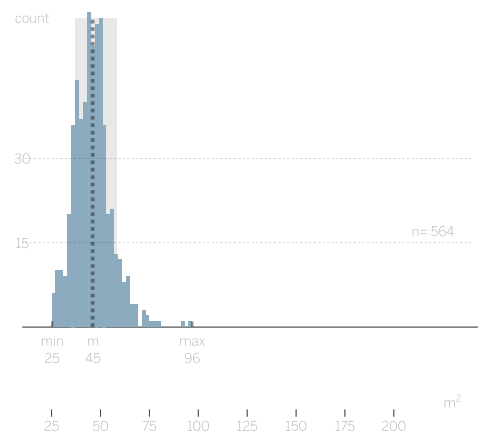
1HR dwellings are self-contained units with a kitchen area and bathroom. None of the space standards and design guidelines discussed in Chapters 1 and 2 have clearly established space standards for studio flats. The recently published NDSS (2015) does not differentiate between studio (1HR) and one-bedroom (2HR) dwellings, with the smallest permitted dwelling size being 37 m², the value taken as reference in the analysis.

Unsurprisingly, 6HR dwellings are on average larger than the prescribed space standards, as larger dwellings tend not to be designed for maximum

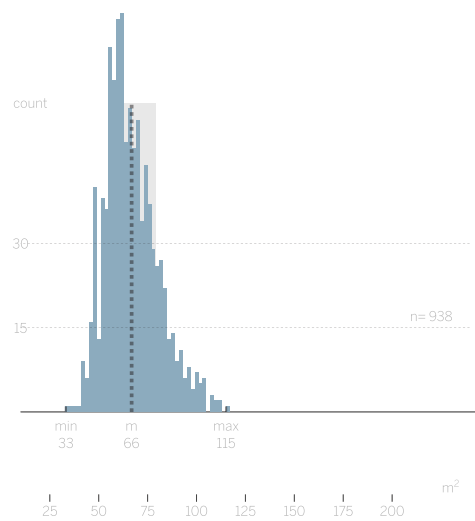
1 HR



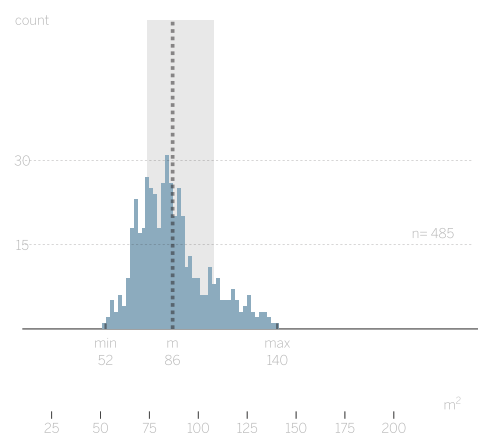
2 HR



3 HR

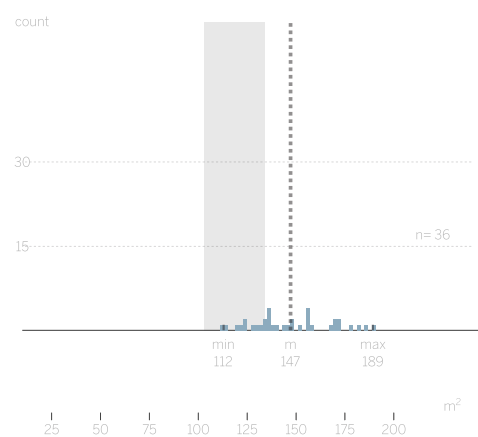
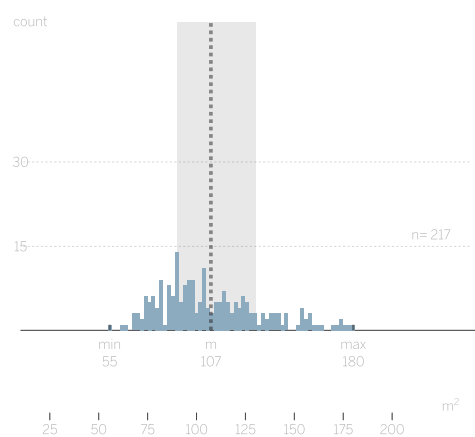


4 HR



6 HR

5 HR



Graph 1
Distribution of dwelling floor area per number of habitable rooms

occupancy rates but for housing in which more habitable rooms are used for other purposes than sleeping.

Morgan & Cruikshank (2014), based on English Housing Survey data, conclude that 55% of housing in England fail to meet space standards. According to our data, the overall is 37%, however, for the most common dwelling sizes – three and four habitable rooms – this figure rises to 44%.

HR	Total	Below		Within		Above	
1	61	43	70.49%	16	26.23%	2	3.28%
2	564	99	17.55%	306	54.26%	159	28.19%
3	938	408	43.50%	226	24.09%	304	32.41%
4	491	217	44.20%	174	35.44%	100	20.37%
5	217	94	43.32%	74	34.10%	49	22.58%
6	36	2	5.56%	9	25.00%	25	69.44%
	2307	863	37.41%	805	34.89%	639	27.70%

Table 3
The number of units falling below, within, and above space standards range for every HR.



Fig. 5
Exemplary one-storey dwellings ordered according to size.
w/SK = with a separate kitchen, w/oSK=without a separate kitchen

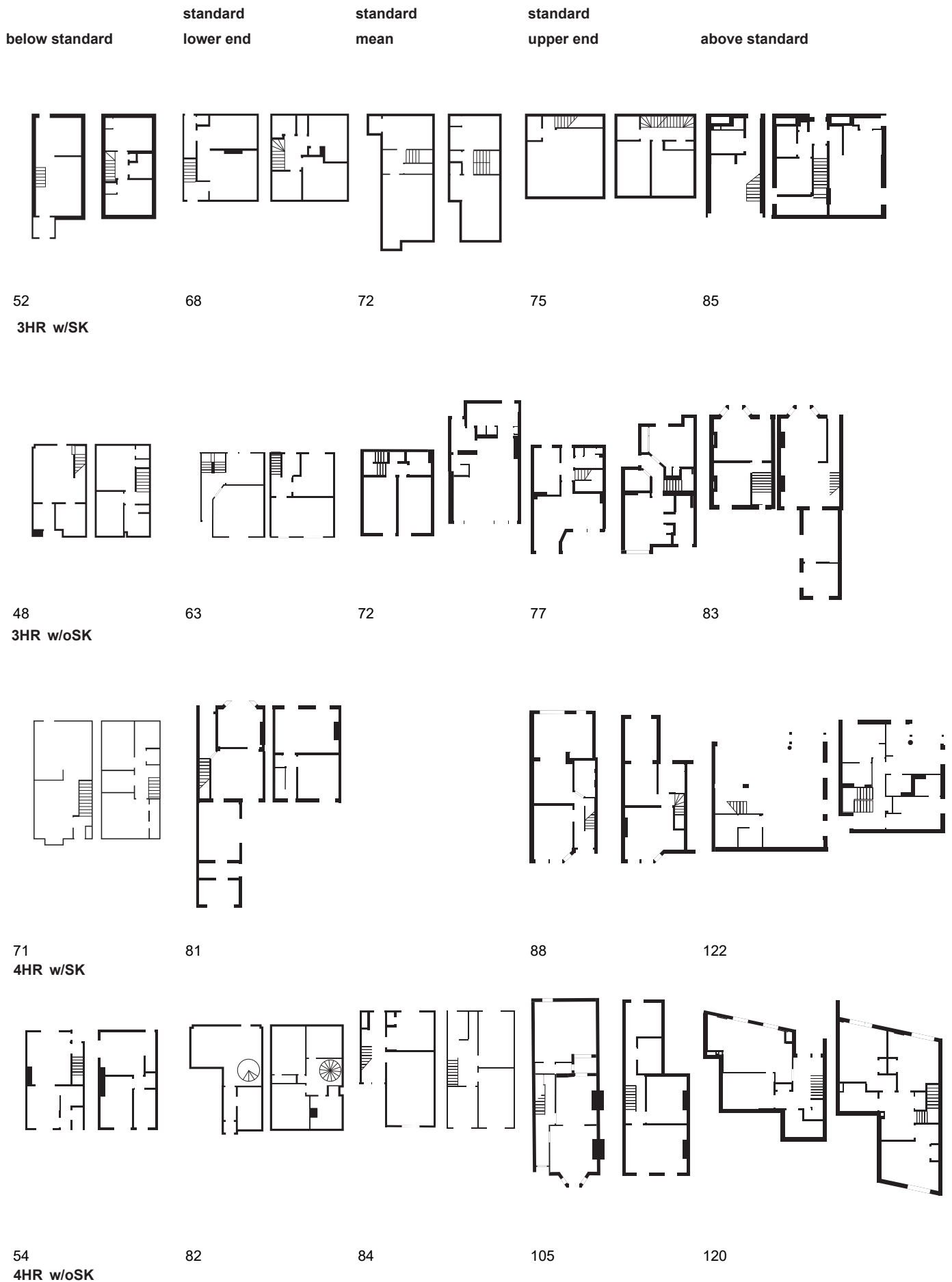


Fig. 6
Exemplary two-storey dwellings ordered according to size.
w/SK = with a separate kitchen, w/oSK=without a separate kitchen

Dwelling Size and Unit Typologies

The analysis and comparisons thus far have given an overview of dwelling sizes. However, they contain a mix of dwelling typologies and built year periods and do not distinguish between housing sectors. All these have a significant impact on understanding dwelling sizes and assessing them. The following sections, therefore, focus on unit typologies, built periods, and housing sectors.

In Graph 2, the distribution of floor areas and their mean according to dwelling typologies (single-, two-, and three-storey dwellings) is compared to the areas given in the Nationally Described Space Standards (Table 2). The majority of the sample is made up of one- (1,537) and two-storey (668) dwellings, with a smaller number of three-storey dwellings (102).

The mean dwelling sizes fall within the minimum space standards prescribed by the NDSS – except for three-storey dwellings, which are above, and that for 1HR dwellings, which is just below.

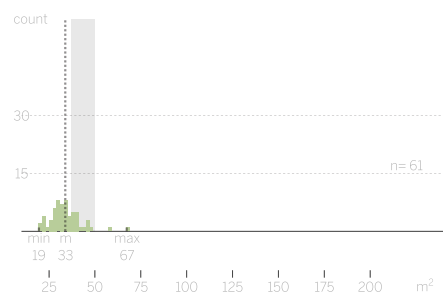
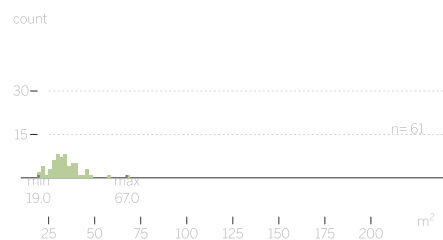
Graph 2 shows that the range of dwelling sizes with the same number of habitable rooms is related to dwelling typologies. 3HR single-storey dwellings have a floor area range from 36 m² to 108 m² with a mean of 65 m², which are distributed 40% below, 25% within, and 34% above the NDSS. 3HR two-storey dwellings measure between 33 m² to 115 m², have a mean of 70 m² and are distributed 56% below, 20% within, and 24% above the space standards (Table 4).

HR	Dwelling Typology	n	Below		Within		Above	
1	One-storey	61	43	70.49%	16	26.23%	2	3.28%
2	One-storey	549	91	16.58%	306	55.74%	152	27.69%
2	Two-storey	15	8	53.33%	0	0.00%	7	46.67%
3	One-storey	733	294	40.11%	186	25.38%	253	34.52%
3	Two-storey	202	114	56.44%	40	19.80%	48	23.76%
3	Three-storey	3	0	0.00%	0	0.00%	3	100.00%
4	One-storey	194	54	27.84%	87	44.85%	53	27.32%
4	Two-storey	278	150	53.96%	82	29.50%	46	16.55%
4	Three-storey	19	13	68.42%	5	26.32%	1	5.26%
5	Two-storey	173	87	50.29%	59	34.10%	27	15.61%
5	Three-storey	44	7	15.91%	15	34.09%	22	50.00%
6	Three-storey	36	2	5.56%	9	25.00%	25	69.44%

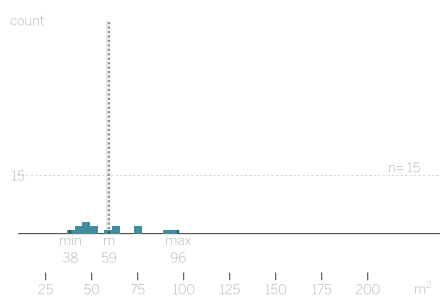
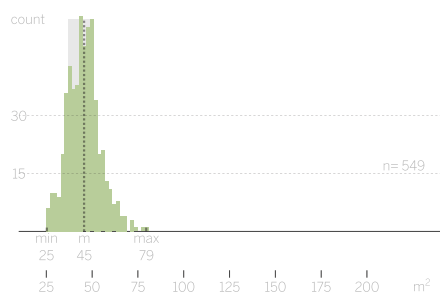
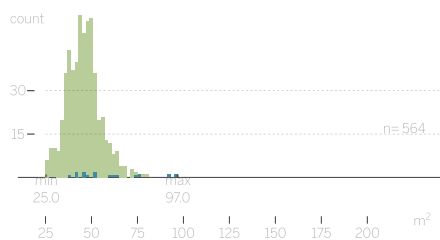
Table 4

The number of dwelling units falling below, within, and above the Nationally Described Space Standards according to habitable rooms (HR) and dwelling typology

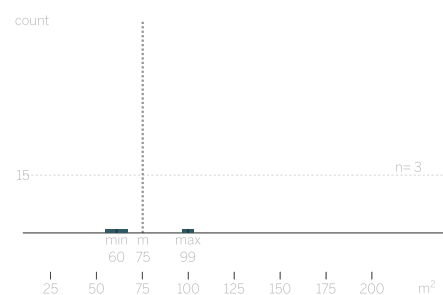
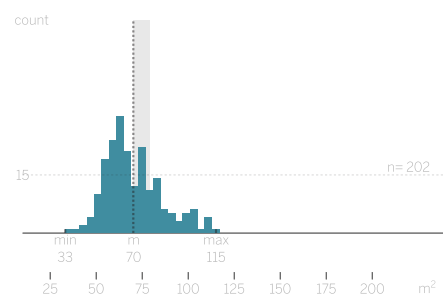
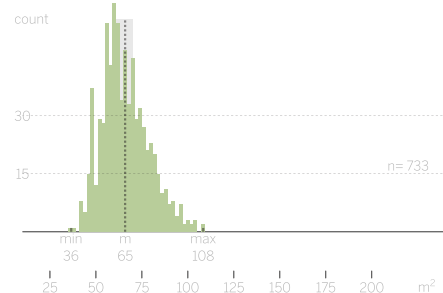
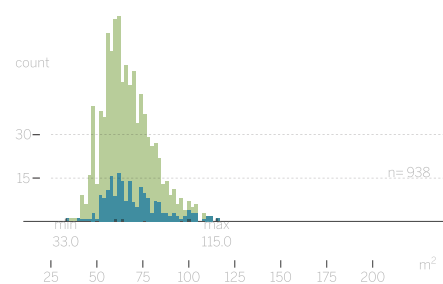
1 HR



2 HR

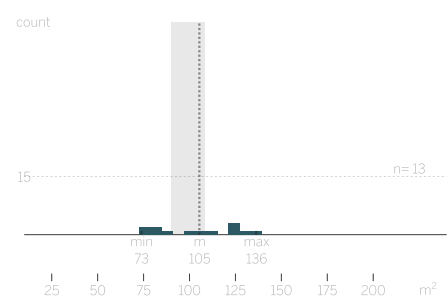
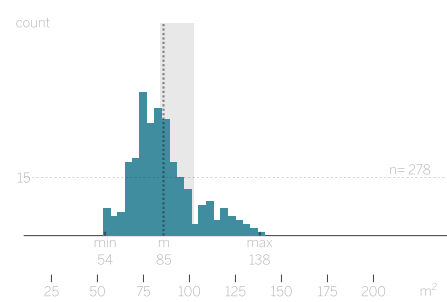
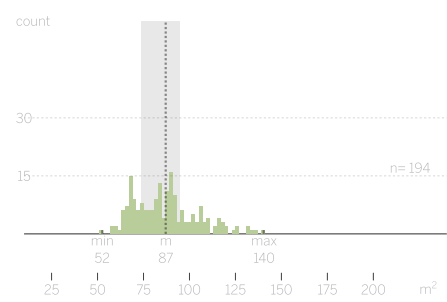
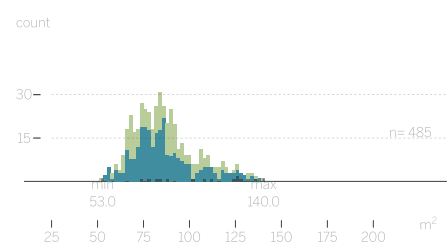


3 HR

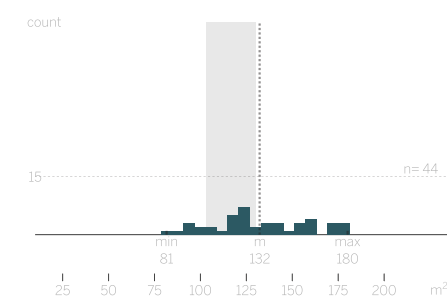
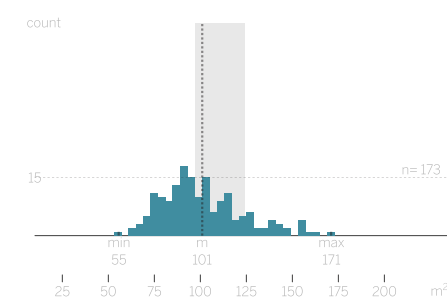
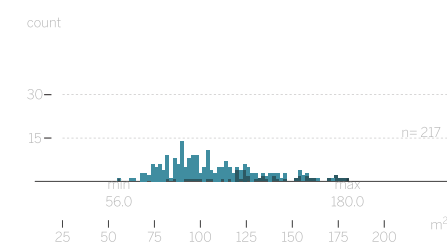


Graph 2
Distribution of Dwelling Floor Area per Number of Habitable Rooms per Dwelling Typology

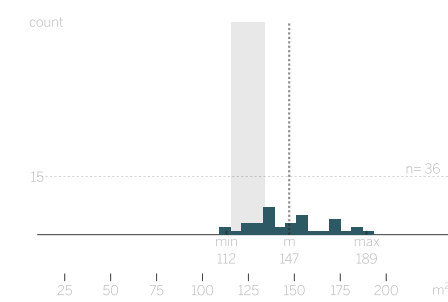
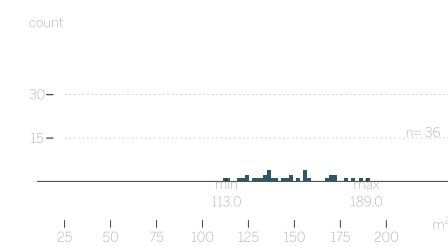
4 HR



5 HR



6 HR



- One-storey dwellings
- Two-storey dwellings
- Three-storey dwellings

Dwelling Size and Built Year

The previous chapters studied the relationships between dwelling typologies, policy, and regulatory frameworks. To analyse this from a statistical and dimensional perspective, in the following graphs dwelling sizes are compared to the year the housing was built and the historical space standards in use at the time (rather than the current NDSS minimum space standards for each rate of occupancy). As past space standards were calculated in various ways (not always according to levels of occupancy or building typology), for consistent comparison their ranges according to the number of habitable rooms were calculated. Where dwelling floor areas were provided, the minimum and maximum floor areas corresponding to a habitable room classification are used. For instance, for 3HR dwellings, this includes the space standards given for different variations of two-bedroom dwellings: those with no occupancy rates specified and those designed as two- to four-person dwellings. Where space standards were not given for total dwelling sizes, the dwelling net floor areas of exemplary plans provided in the design guidelines are measured, including the smallest and largest dwelling sizes in the comparison (Table 5).

HR	Year	Single-Storey		Two-Storey	
		Min	Max	Min	Max
3HR (2B2P; 2B3P; 2B4P)	1919	N/A	N/A	N/A	N/A
	1944	52.2	65	65	N/A
	1949	46.5	60.4	69.7	74.3
	1961	44.6	69.7	N/A	71.5
	1977	N/A	N/A	N/A	N/A
	2007	45	50	N/A	N/A
	2011	61	70	74	83
	2015	61	70	70	79
	2015	61	70	70	79
4HR (3B3P; 3B4P; 3B5P; 3B6P)	1919			70	107
	1944	65	72	65	88
	1949	65.1	N/A	83.6	88.3
	1958				
	1961	56.7	86.4	71.5	92
	1977	N/A	N/A	78.9	99.5
	1985				
	2007	57	67	N/A	N/A
	2011	74	95	87	105
	2015	74	95	84	102

The space standards are derived from: 1919, Manual on the preparation of state-aided housing schemes; 1944, Housing Manual; 1949, Housing Manual; 1958, Flats and Houses: Design and Economy; 1961, Homes for Today and Tomorrow; 1977, GLC Preferred Dwelling Plans; 1985, Housing Act; 2007, Design and Quality Standards; 2011, London Housing SPG; 2015, Nationally Described Space Standards

Table 5
Historical space standard ranges converted to the number of habitable rooms.

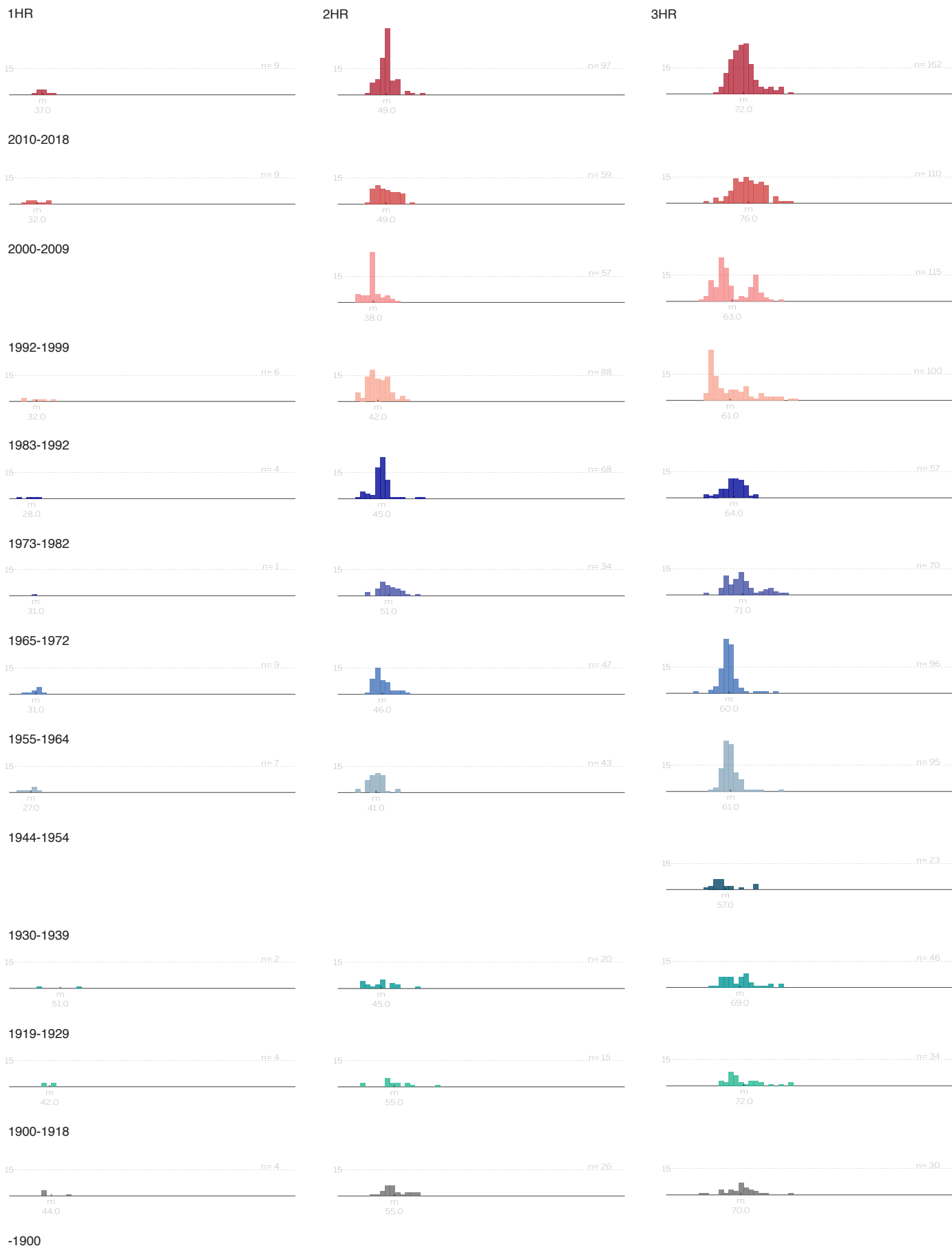
Graph 3 shows dwelling size distribution in relation to built year periods. The comparison of dwelling size, built year, and historical space standards, focuses on 3HR and 4HR dwellings, as for these a larger sample size is available in the dataset and they are most common in London. The dwelling sizes for different dwelling typologies and housing providers were plotted separately for one- and two-storey dwellings, as space standards were prescribed differently for flats and houses/maisonettes (Graphs 4-7).

The changes in floor areas are overall consistent with changes in space standards, which have been only used in 1919–1921 (limited to 4HR dwellings), 1944–1981, and since 2015. The standards for both 3HR and 4HR dwellings show an increase from 1944 until 2015. The average dwelling size follows this pattern with drops between 1981 and 2015 when no space standards were in use. However, in the past two decades, there has been an increase in the average size of dwelling units.

This contradicts other studies that found a continuous decrease in space standards since the 1980s, for example, the LABC study of 10,000 houses across the UK (2020). Our analysis shows a fluctuation between 61 m² and 75 m² (for one-storey, 3HR) and between 79 m² and 101 m² (for two-storey, 4HR) since the 1970s with an overall trend of increasing dwelling size. Like many other comparisons of space standards and house sizes, the LABC study uses nationwide data while our data only includes housing in London, an important difference that is often overlooked.¹¹ For instance, the RIBA report, Case for Space (2011), shows that the average size of a three-bedroom house (4HR) is 119 m², 13 m² larger than the closest average dwelling size of 96 m² in the Southeast region.¹²

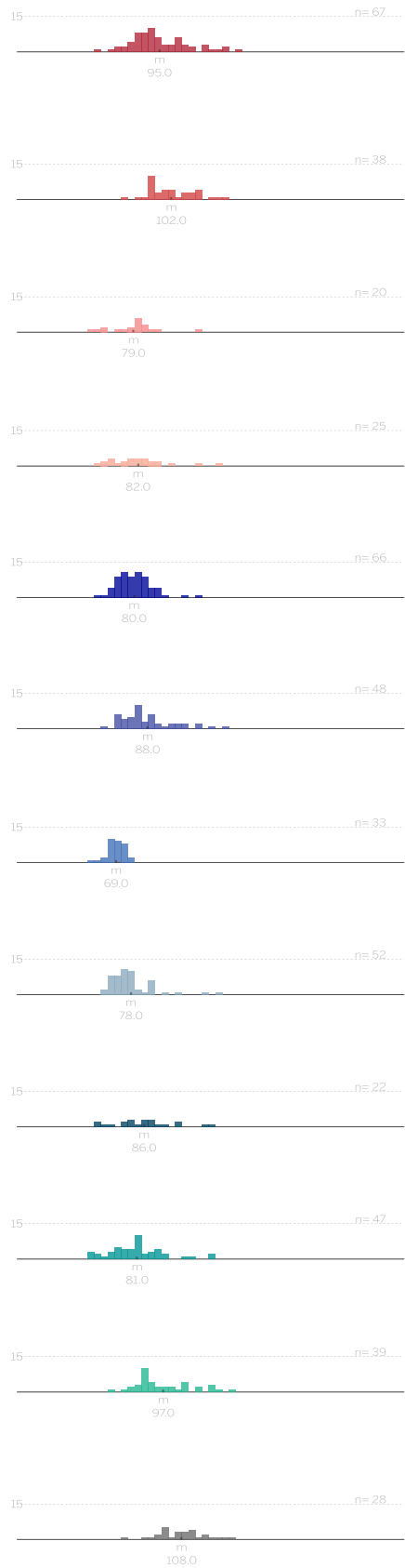
11.
'What is the Average House Size in the UK', Are Britain's Houses Getting Smaller - New Data, LABC Warranty, [accessed September 1, 2020.] <https://www.labcwarranty.co.uk/blog/are-britain-s-houses-getting-smaller-new-data/>.

12.
See p.23

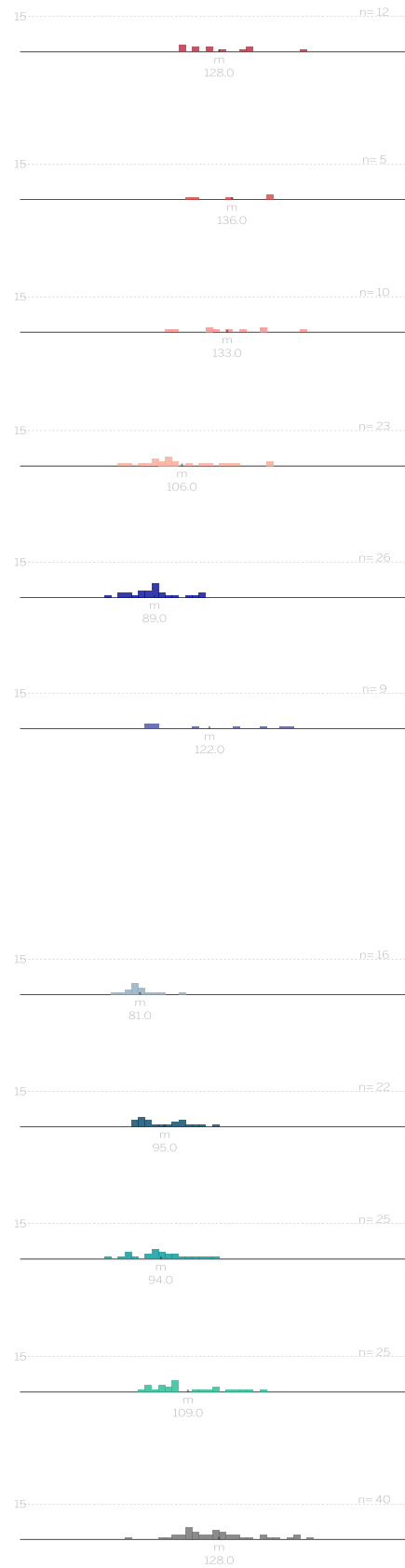


Graph 3
Distribution of Dwelling Floor Area per Number of Habitable Rooms per Built Year

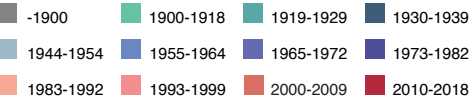
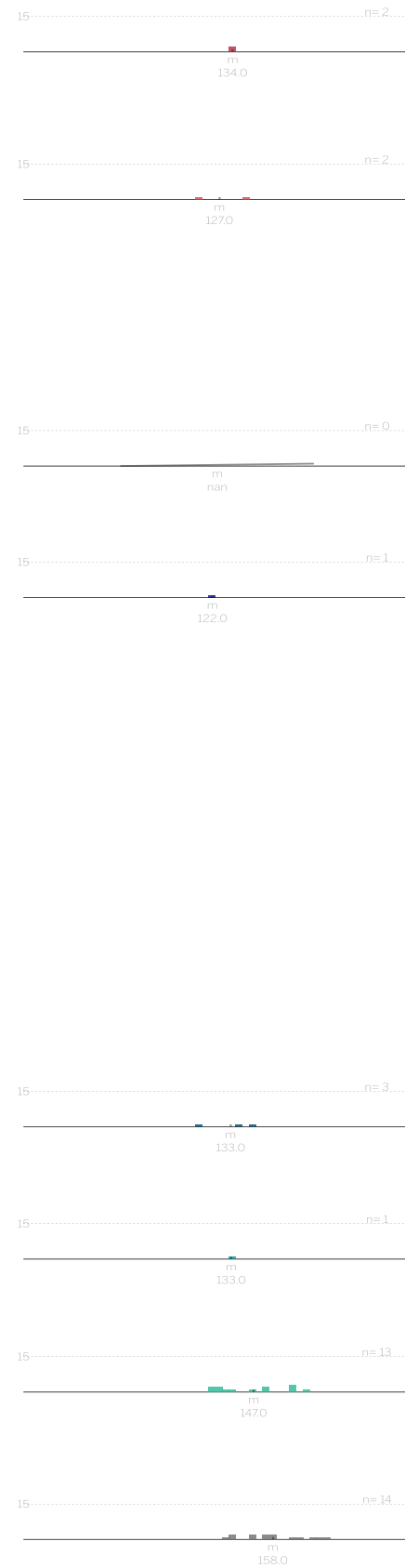
4HR

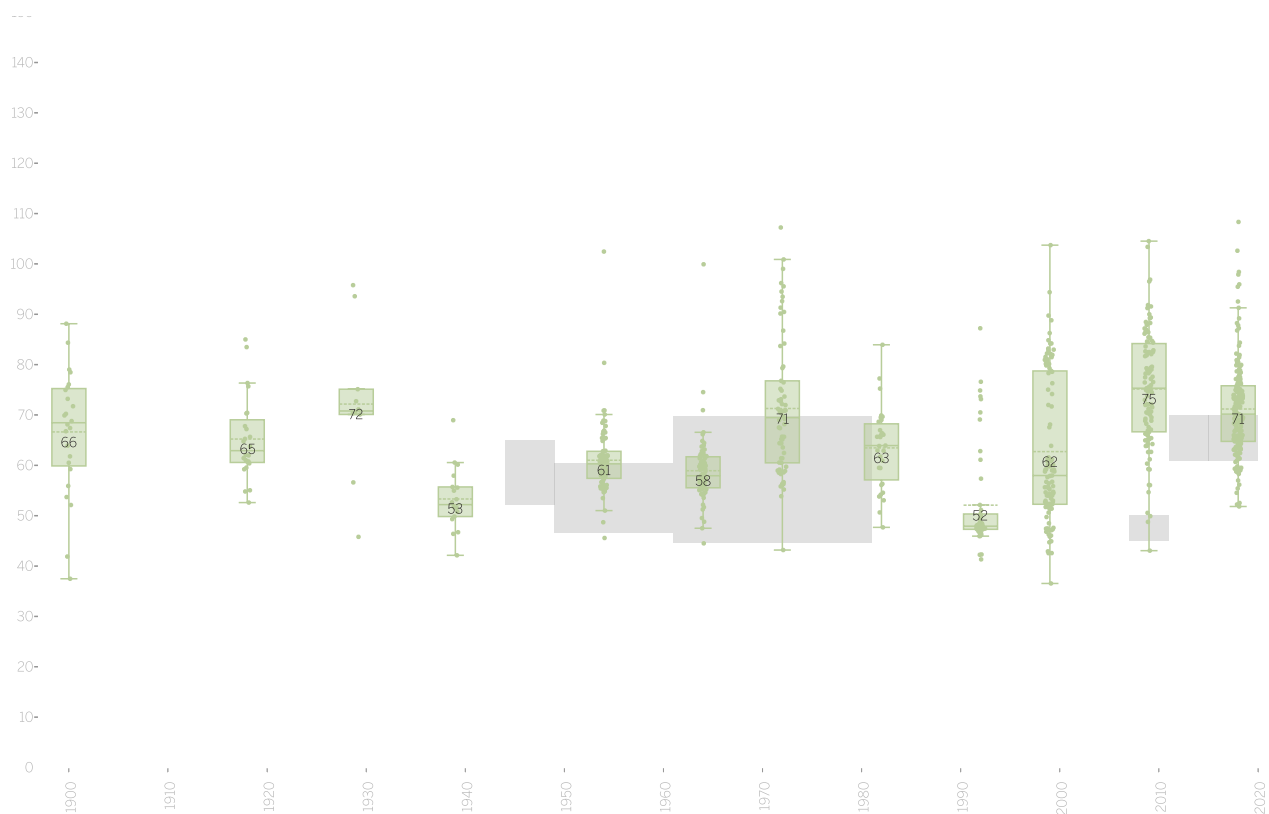


5HR

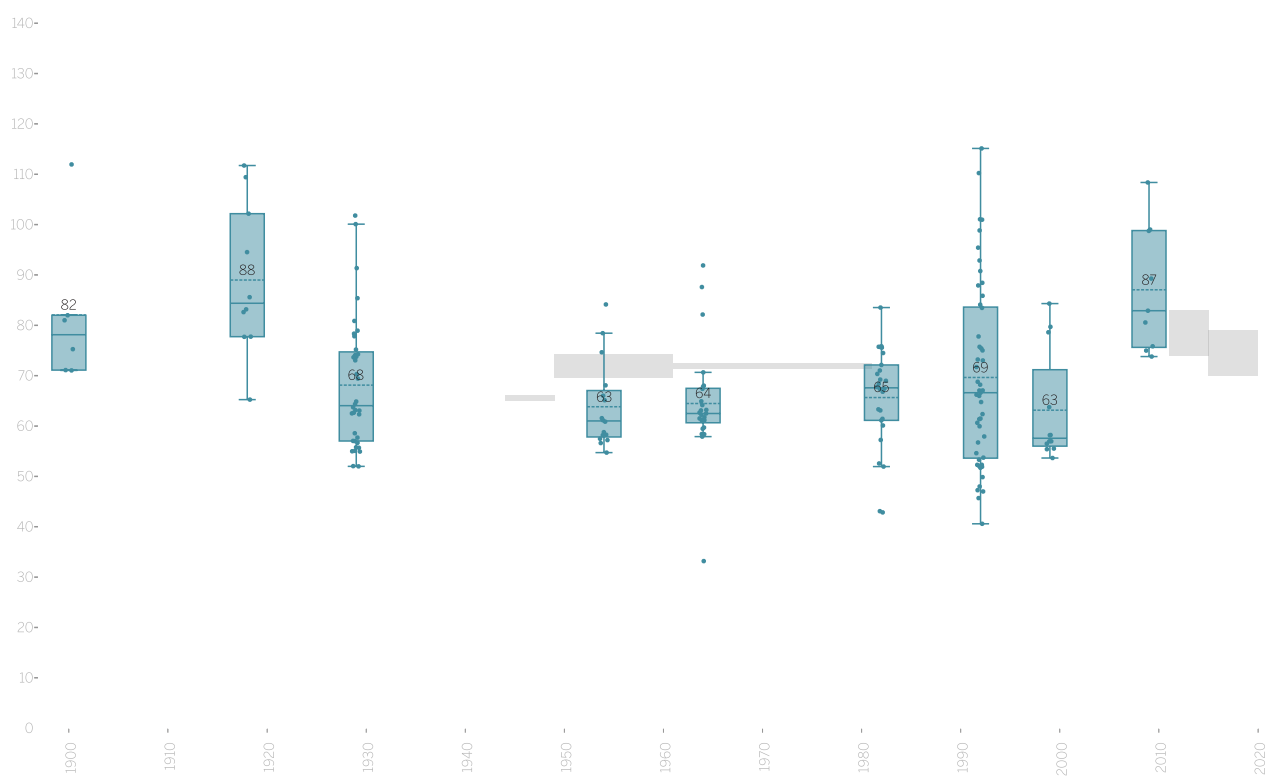


6HR

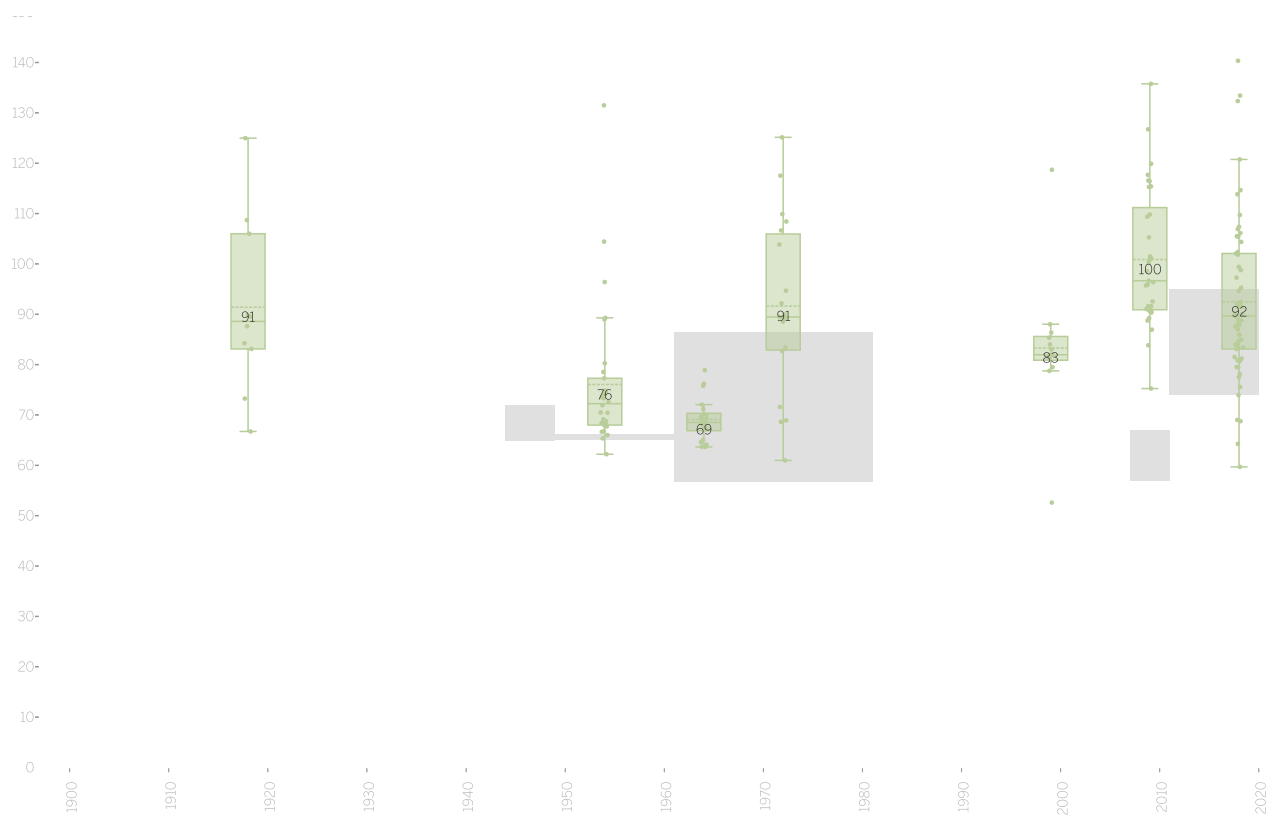




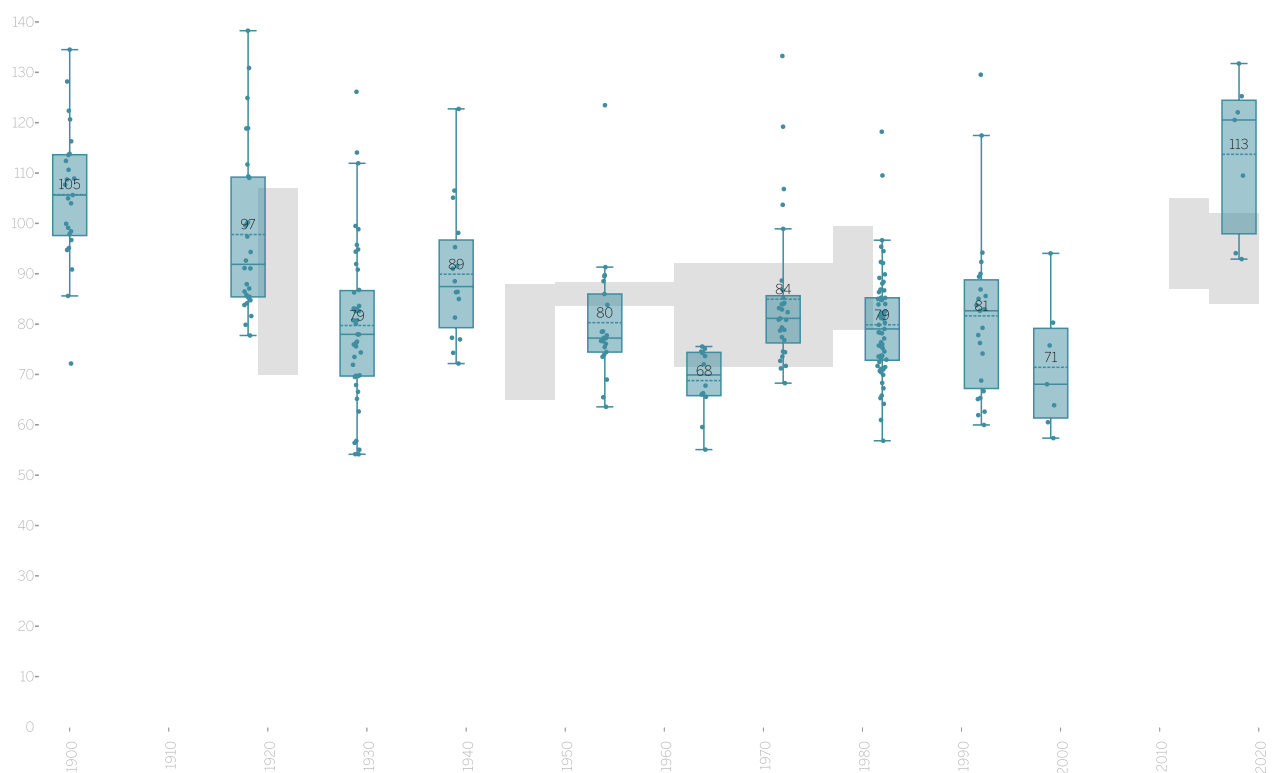
Graph 4
Distribution of Dwelling Sizes of Single-Storey 3HR Dwellings per Built Year



Graph 5
Distribution of Dwelling Sizes of Two-Storey 3HR Dwellings per Built Year



Graph 6
Distribution of Dwelling Sizes of Single-Storey 4HR Dwellings per Built Year



Graph 7
Distribution of Dwelling Sizes of Two-Storey 4HR Dwellings per Built Year

Single-storey dwellings
Multiple-storey dwellings

The graphs also show that two-storey dwellings compared to single-storey ones built in the same period and providing the same number of habitable rooms are not significantly larger throughout most periods, as an additional circulation area of 11.5 m² is expected. In the periods in which space standards were applied, the expected difference between single-storey and multiple-storey dwellings are however much smaller. In 3HR dwellings, the difference is larger for the periods before 1930 (16 m² in dwellings built before 1900, 23 m² in dwellings built between 1900 and 1919) and after 1980 (17 m² in dwellings built between 1982 and 1990, and 12 m² in dwellings built between 2000 and 2009) than the periods between 1954 and 1982 (2, 6, 2 m² respectively). Although the data is limited to fully compare 4HR dwellings (three-bedroom flats), a similar pattern is visible with very small differences in the period 1954-1981 and increasing differences in the 1990s and 2000s.

As shown in Table 4, overall, a comparatively higher portion of two-storey dwellings are below the minimum space standards (54% for two-storey and 31% for one-storey dwellings). While a significant proportion of two-storey dwellings in the sample are drawn from older dwellings that were extended or divided into smaller units without being subject to space standards, this does not explain these differences. Only 45% of two-storey dwellings in terraced houses, including conversions and unconverted houses, fail space standards (compared to 54% for all two-storey dwellings). It can, however, be explained by the efficient circulation design in some multi-storey dwellings.

The London Housing Design Guide (2010) calculates the circulation space for a two-bedroom single-storey dwelling as 8.5 m² and a two-bedroom two-storey dwelling as 19 m², an additional 12.5 m². However, as shown in Figure 2, the additional circulation area in two-storey dwellings is, in general, less than the prescribed areas. It is therefore important to consider the dwelling morphology and plan design when assessing floor areas and usability as, for example, in cases where circulation space standards are not met, layouts might simply differ from those considered in the calculation of space standards without compromising dwelling usability (Fig. 7-8).

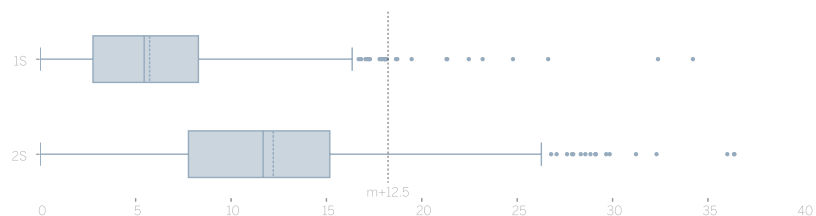
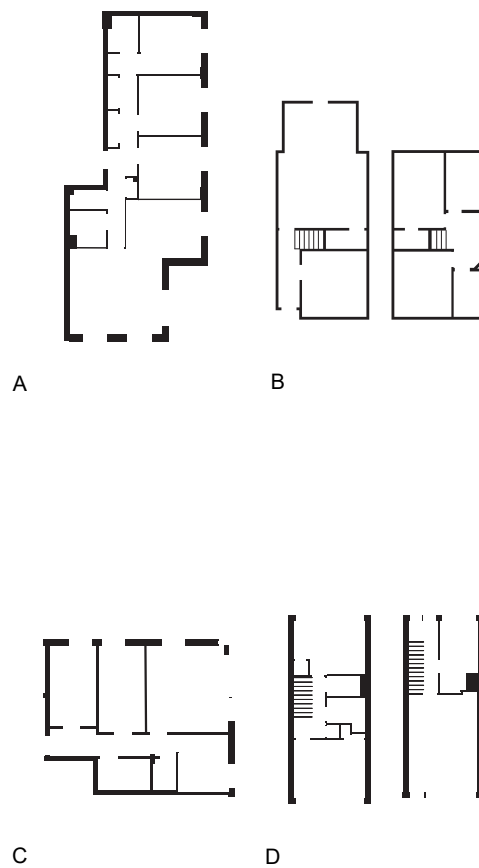
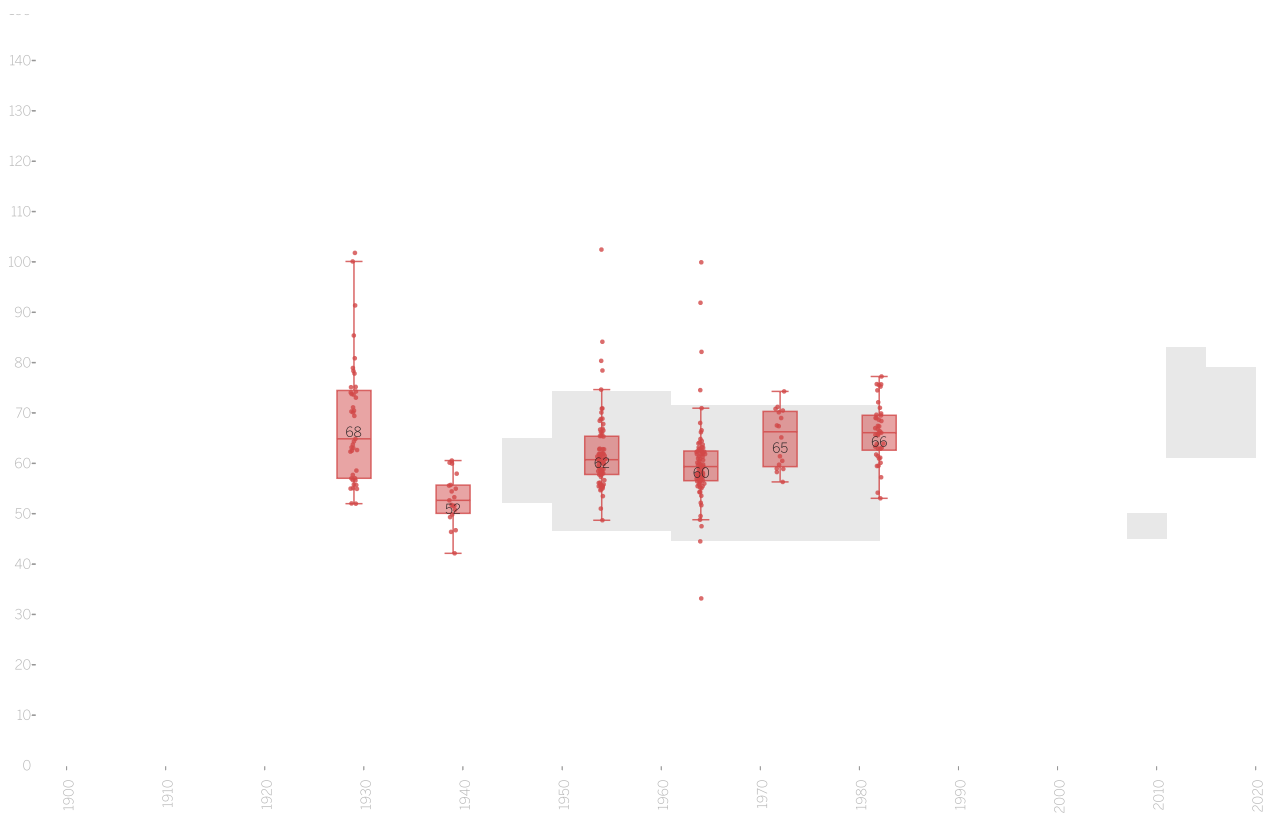


Fig. 7
Distribution of circulation sizes in one-storey and two-storey dwellings.

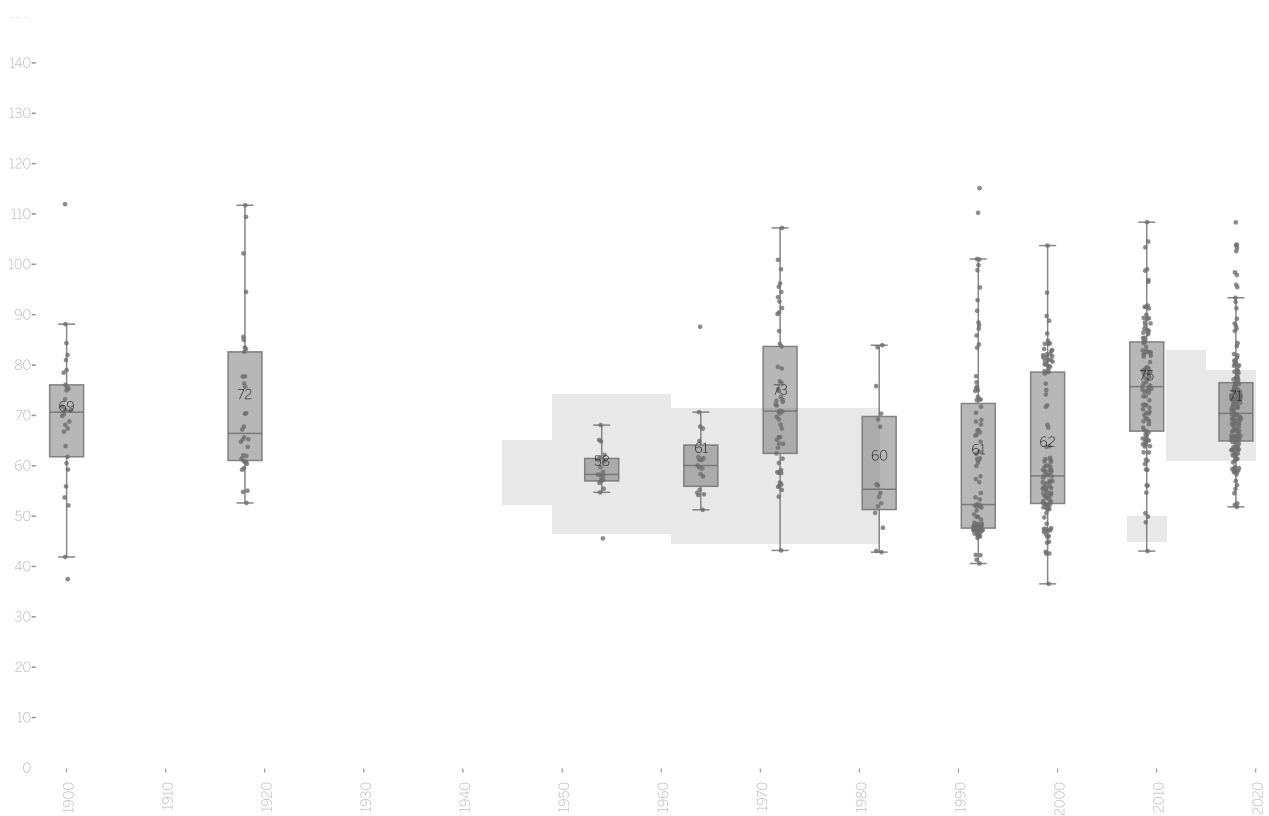


HR	Plan A	Plan B	Plan C	Plan D
Total Floor Area	87	86	65	65
Total Bedroom Area	33	26	21	22
Total Living Area	33	40	28	26
Total Bathroom	8	4	7	5
Total Circulation	9	11	8	12

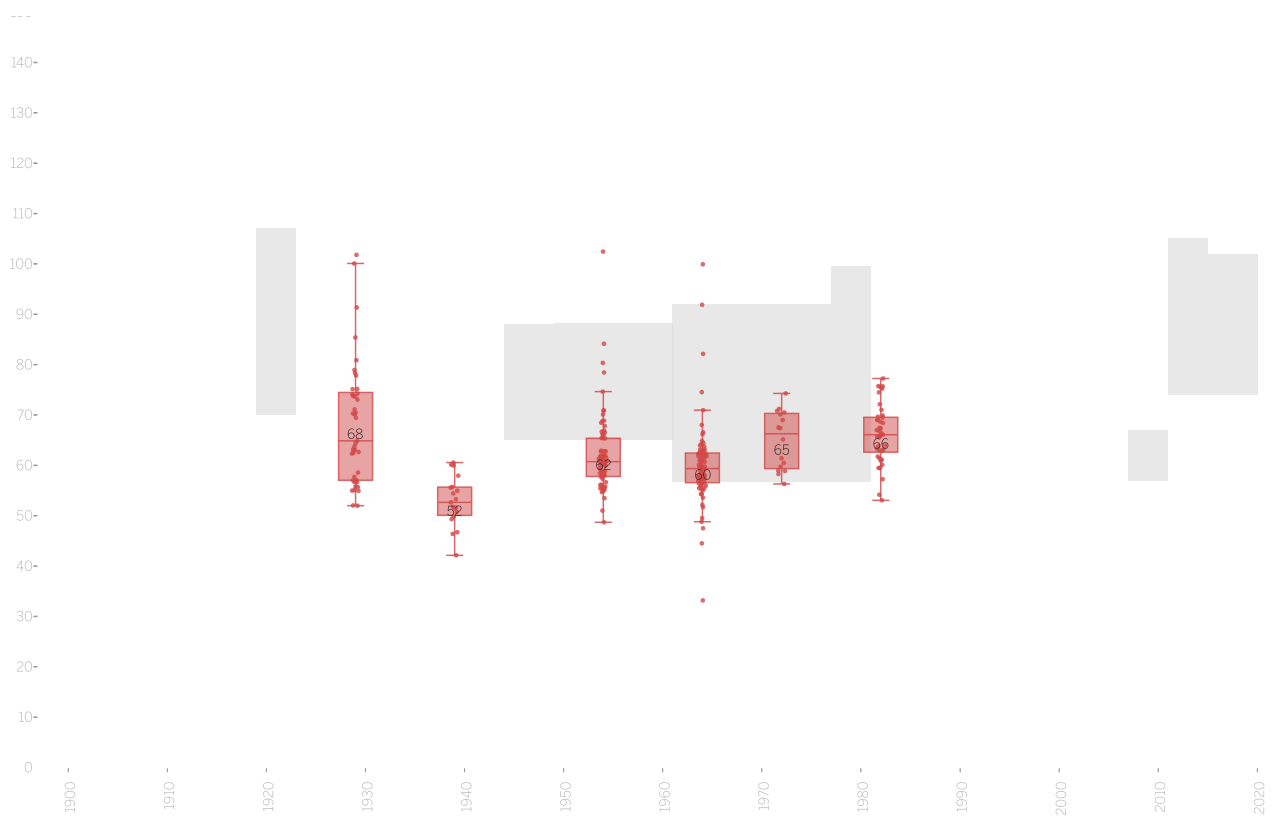
Fig. 8
Comparison of one- and two-storey dwellings with the same floor area. As shown in the table, the main differences are circulation and bathroom sizes.



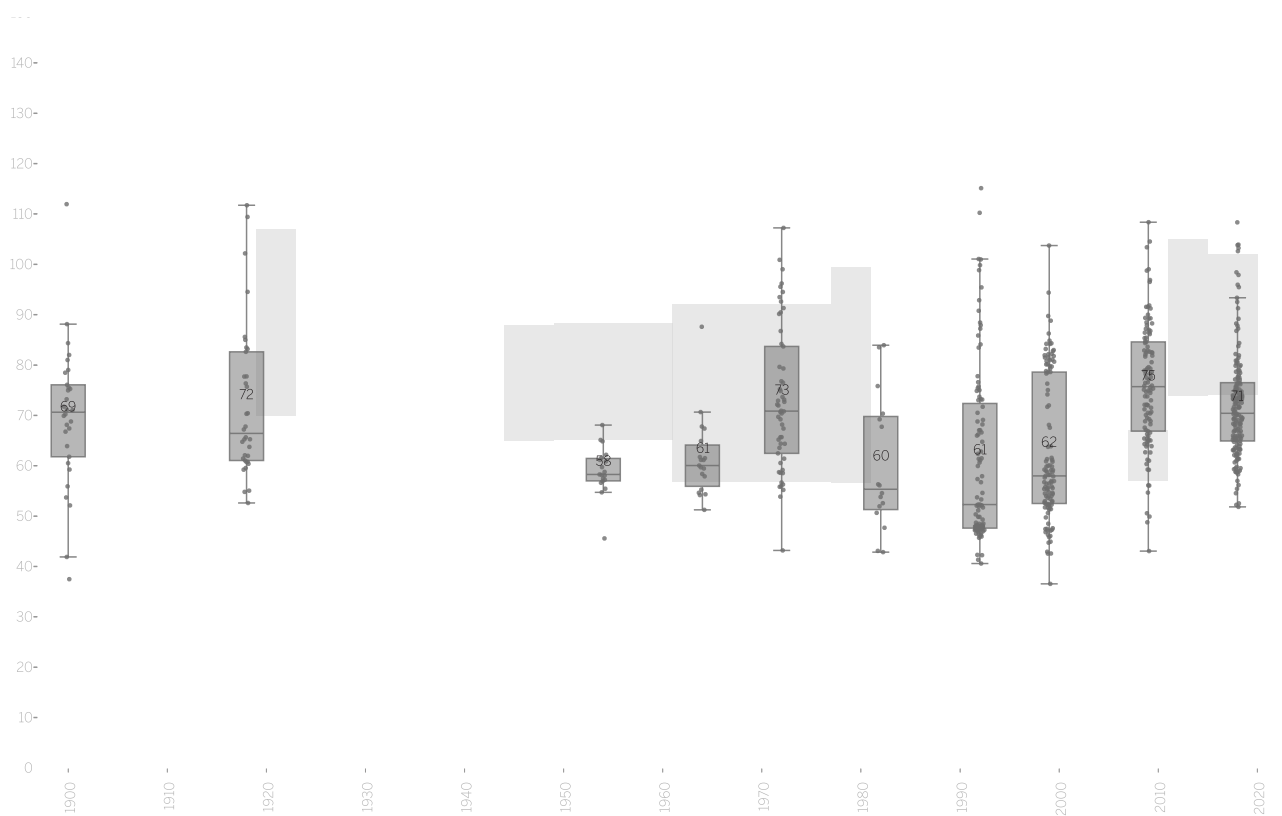
Graph 8
Distribution of Dwelling Sizes of Public Sector Built 3HR Dwellings per Built Year



Graph 9
Distribution of Dwelling Sizes of Private Sector Built 3HR Dwellings per Built Year



Graph 10
Distribution of Dwelling Sizes of Public Sector Built 4HR Dwellings per Built Year



Graph 11
Distribution of Dwelling Sizes of Public Sector Built 4HR Dwellings per Built Year

Public Sector Built
Private Sector Built

Dwelling Size and Provider

The next graphs illustrate how dwelling sizes differ between public and private sector housing. Graphs 8-11 show the distribution and mean dwelling floor areas for 3HR and 4HR dwellings for each built year category and housing sector. It is evident that public sector dwellings, which had to be designed to meet prescribed space standards, are smaller than private-sector ones where space standards did not apply. 3HR dwellings built by the public sector have average floor areas fluctuating between 52 m² and 68 m², whereas those built by the private sector have average floor areas between 58 m² and 75 m².

While public sector housing expectedly follows changes in space standards, it is also evident that changes in dwelling sizes in the private sector over time follow those in space standards. However, while dwelling sizes in the public sector are generally within a narrow range, it also has many much smaller and larger units than the public sector. As Karn & Sheridan (1994) show, in the 1990s, when no space standards were in place, lower-end private-sector dwellings were smaller than public sector dwellings. To fully evidence the differences in the private and public sector dwellings, a targeted sample of housing is needed. For instance, it would be useful to limit the sample to a council tax band built in the same period (as council tax bands are not up to date for older dwellings) and location (as a location has a significant impact on the type of dwellings being built), to better understand the differences. It might also be useful to compare housing from outside London, where dwelling layouts are more standardised.

Dwelling Dimensions

The previous chapters discussed how regulatory and planning frameworks relate to preferences in building and dwelling typologies. The dwelling dimensions and footprint shapes (shape compactness) of dwelling plans were analysed to see whether this correlation is evident in dimensional changes and quantifiable.

Graphs 12 and 13 show the maximum dwelling width and length of 3HR single-storey and 4HR two-storey dwellings for every built year category. These dimensions are the width and length of the minimum bounding box drawn from the widest points of a dwelling. Regardless of the actual unit orientation, the dimensions are compared while referring to either a short or long dwelling side. Taking into consideration the discussion in Chapter 2 on housing typologies, the following was assumed:

- Houses and maisonettes tend to have windows and doors on the short side, with the long side representing a house's depth.
- Many terraced houses had back extensions added since they were first built, therefore they, and dwellings deriving from their conversion, are noticeably deeper in plan than other samples.
- Flats in properties built before 1939 are usually not purpose-built but the result of conversions and, therefore, their footprint shape resembles that of houses (Fig. 9).

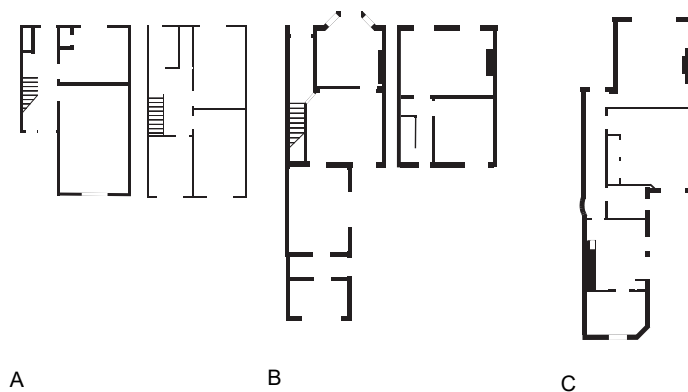
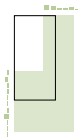
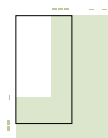


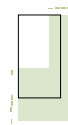
Fig. 9
Different terraced house morphologies and depths.



-1900



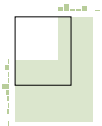
1900-1918



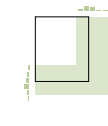
1919-1929



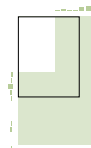
1930-1939



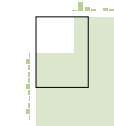
1944-1954



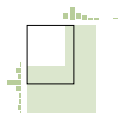
1955-1964



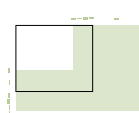
1965-1972



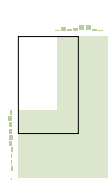
1973-1982



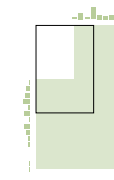
1983-1992



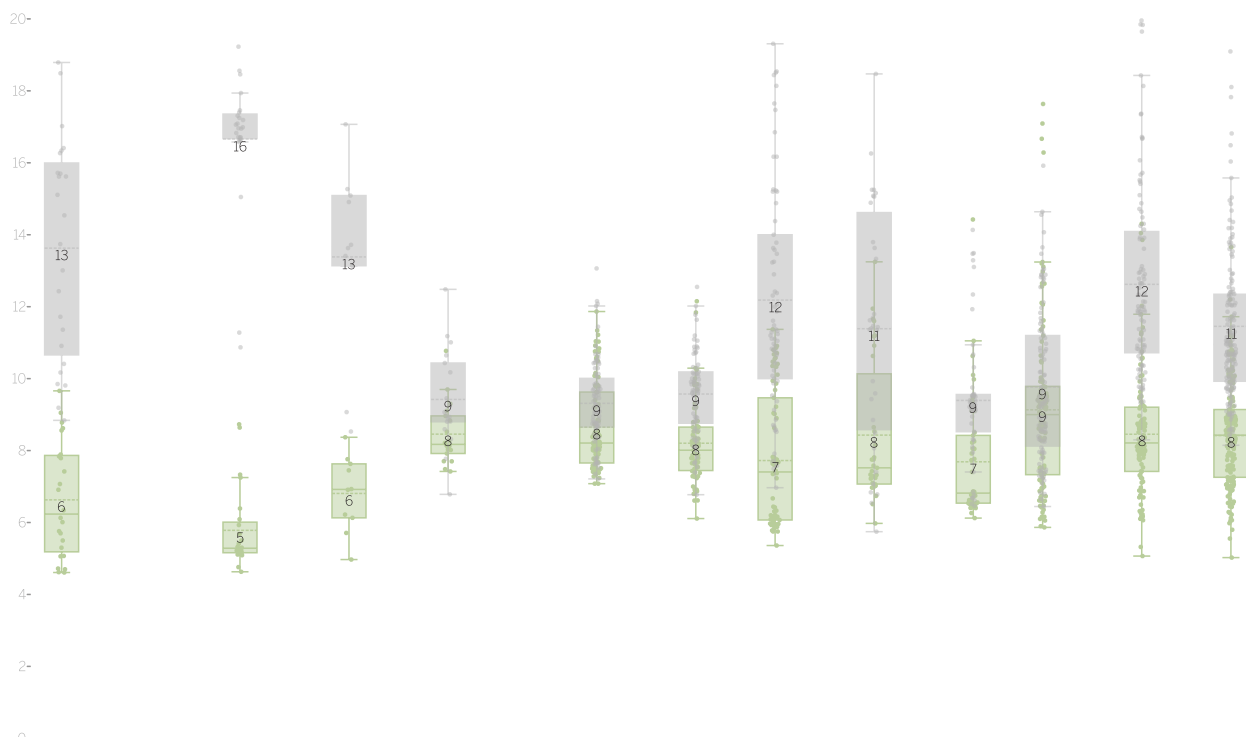
1992-1999



2000-2009

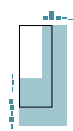


2010-2018



Graph 12
Distribution of Width and Length of One-Storey 3HR Dwellings per Built year

Footprint Length (One-storey)
Footprint Width (One-storey)



-1900



1900-1918



1919-1929



1930-1939



1944-1954



1955-1964



1973-1982



1983-1992



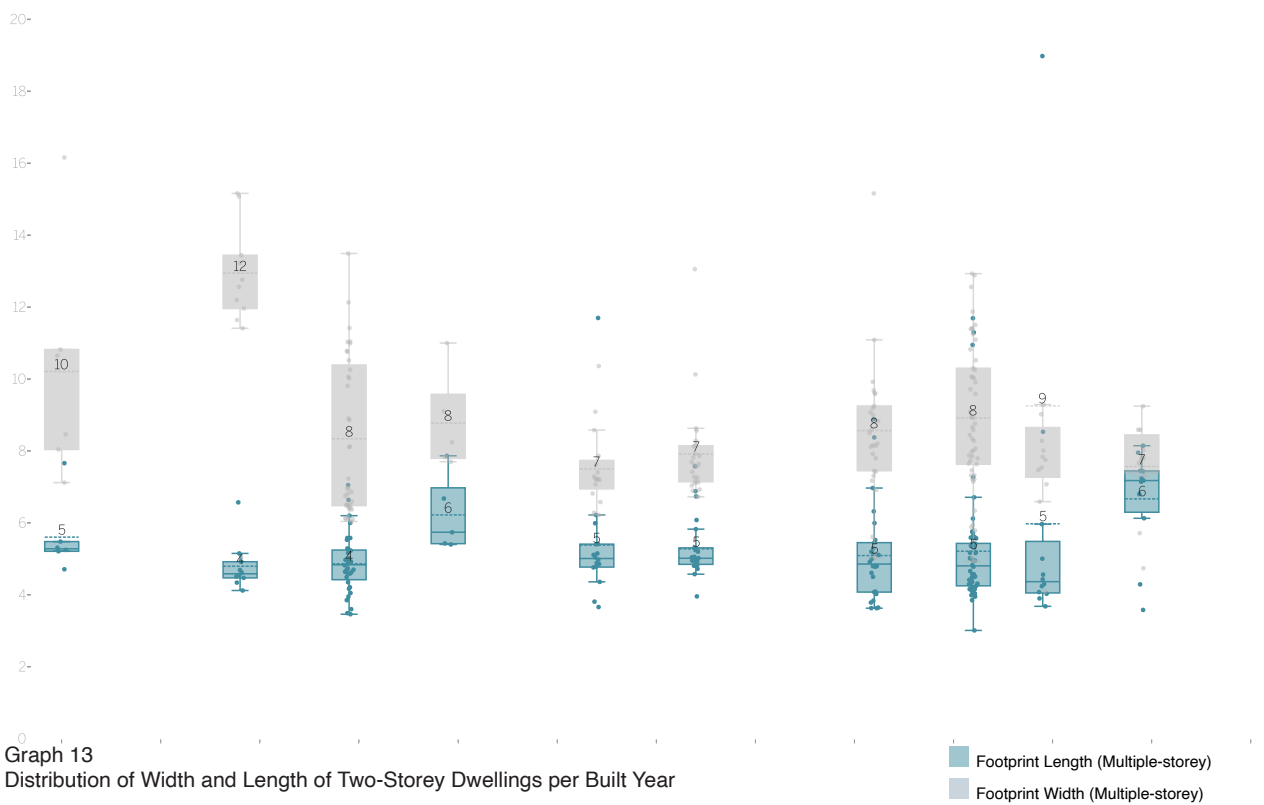
1992-1999



2000-2009



2010-2018



The short side of single-storey dwellings (3HR) has historically increased from an average of 6 m to 8 m with slight fluctuations. In contrast, their long side decreased from an average of 13 m to 11 m, with the dwelling length particularly short in the period 1945–1964 (9 m). Overall, plans have become more square and compact. Plans becoming deeper and narrower suggest that there might be issues with natural lighting and cross ventilation in newer homes (Fig. 10, compare plan A to B). This might also be a result of changing block typologies, especially of the number of flats per core and access typologies (Fig. 10, compare plan C to A and B). However, to verify this a more comprehensive assessment that includes window locations and building orientations are required.

The short side of two-storey dwellings (4HR), however, is stable across built year periods, ranging between 4 m and 6 m, with a recent trend of increase in width. Similarly, the average dimension of their long side is stable for buildings built after 1930, fluctuating between 8 m and 10 m. The long sides of all dwellings built before 1929 in comparison measure on average 13 m, with the increase commonly indicating rear extensions to the older housing stock.

The relationship between the dwelling's overall dimensions and morphology was further analysed by assessing the footprint shape via its compactness ratio (calculated by dividing the net floor area of the ground floor plan by the area of the bounding box of a dwelling). Along with the short to long side ratio, the compactness ratio gives a good indication of the dwelling type and building typology. Flats are found in a wider range of different footprint shapes and layouts. For instance, individual units in a block of flats might be arranged in an interlocking manner, whereas houses and maisonettes are typically not. Plotting compactness ratios for 4HR two-storey dwellings (ground floors) and 3HR single-storey dwellings supports this (Graphs 14 and 15). On average, two-storey units are more compact than flats. Looking at the same distribution in relation to different built years, no correlation other than that linked to building typologies, e.g. terraced houses with back extensions, can be observed.

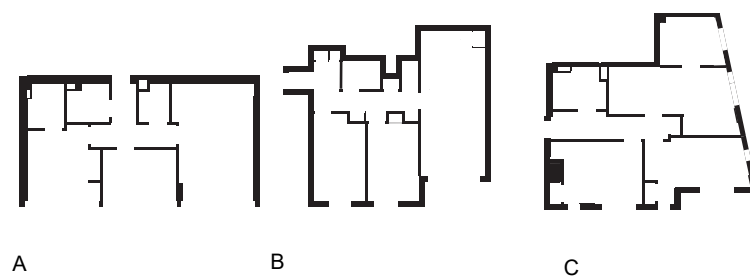
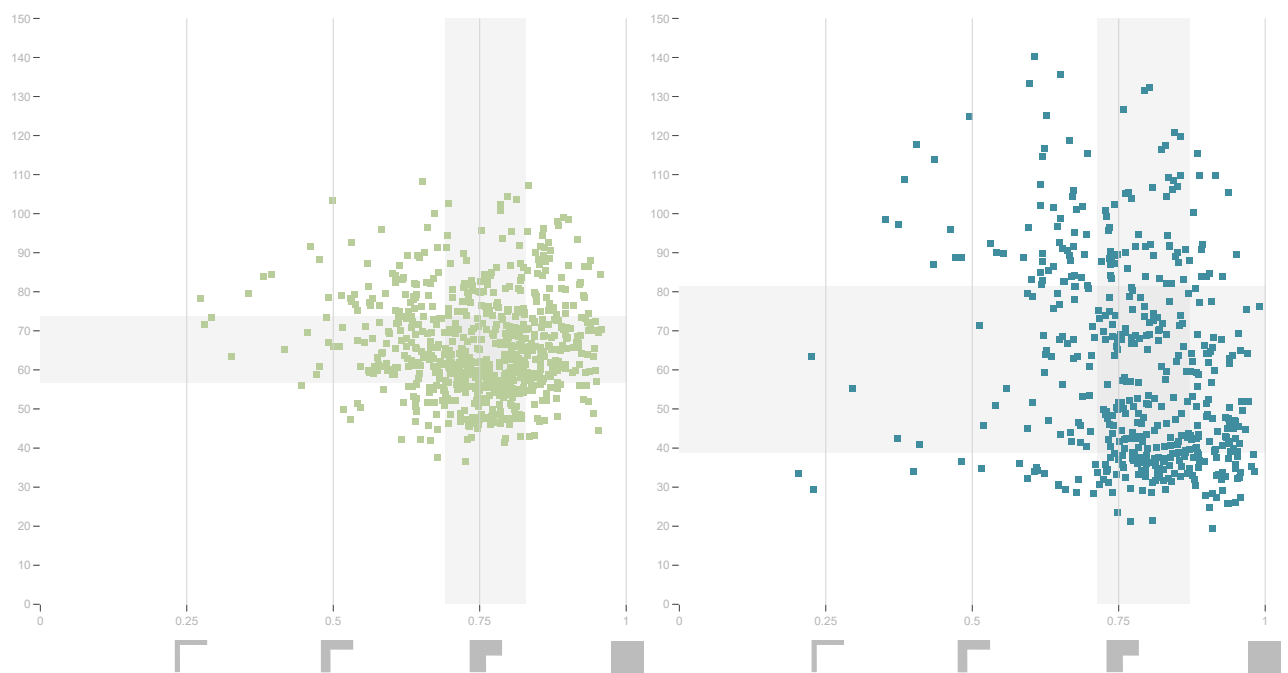


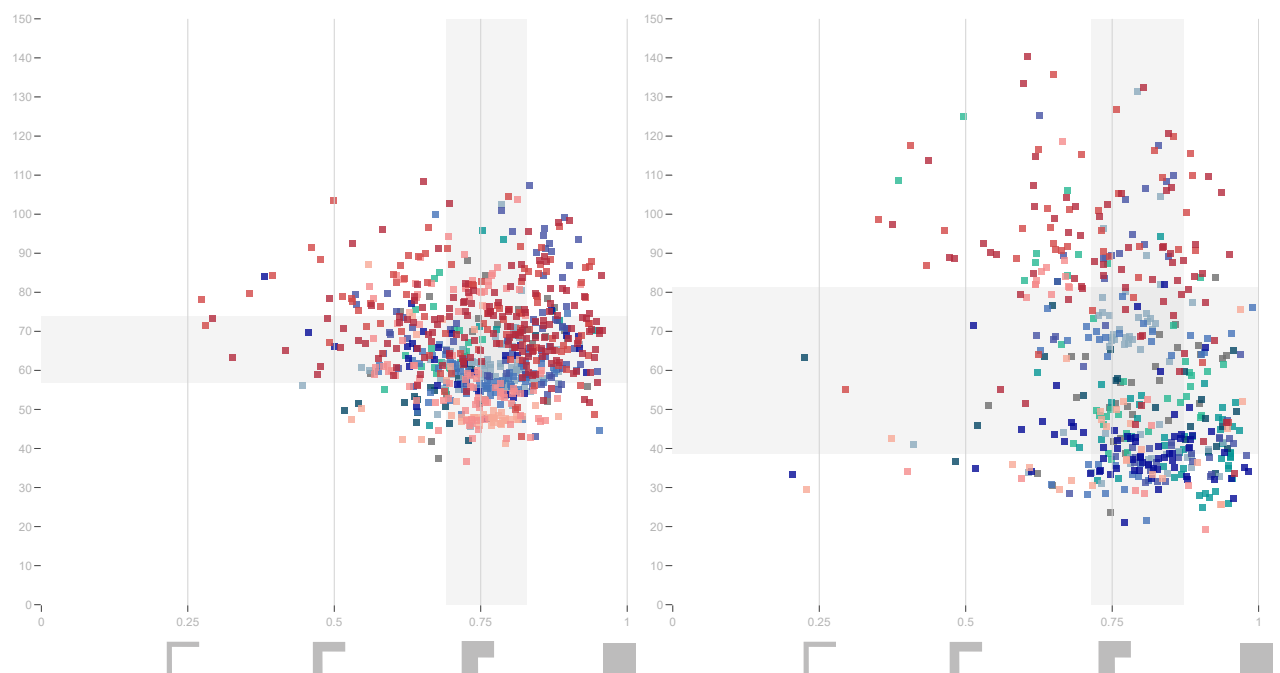
Fig. 10
Variations of plan depths. Plans A and B are single-aspect, C is dual-aspect.



Graph 14

Distribution of Dwelling Size and Compactness Ratio of One-Storey 3HR and Two-Storey 4HR Dwellings

Single-storey dwellings
Multiple-storey dwellings



Graph 15

Distribution of Dwelling Size and Compactness Ratio of One-Storey 3HR and Two-Storey 4HR Dwellings per Built Year

-1900 1900-1918 1919-1929 1930-1939
1944-1954 1955-1964 1965-1972 1973-1982
1983-1992 1993-1999 2000-2009 2010-2018

Room Sizes

Room sizes are important to space standards calculation. The analysis of rooms differentiates between 'primary rooms' (the largest habitable room in a dwelling) and smaller 'secondary rooms'. The largest habitable rooms are typically used as living rooms and are significantly bigger than bedrooms. The following further differentiates between dwellings in which the primary room is a combined living and kitchen space and those in which these two functions are in separate rooms. This matters, as space standards vary for separate and habitable kitchens.

Graph 16 shows the distribution of room sizes for all three types of main rooms (primary, secondary, and habitable kitchens). There is a great difference in room sizes from 4 m² to 50 m². However, the size of primary rooms has averages of 30 m² and 19 m² and the size of secondary rooms is an average of 12 m².

To compare room dimensions and space standards in more detail, the dimensions of primary and secondary rooms in relation to the built year and respective space standards were plotted (Tables 6-7). Space standards were calculated differently for each room type:

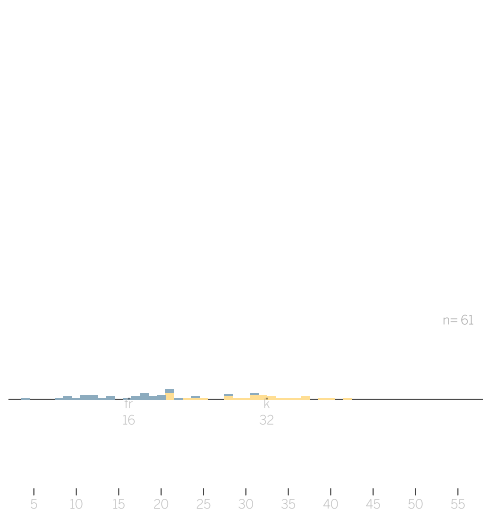
- Primary rooms including a kitchen: the minimum space required for living, dining, and kitchen areas.
- Primary rooms without a kitchen: the minimum space required for living and dining.
- Secondary rooms: the double bedroom space standard.¹³

13.
The NDSS stipulates that the largest bedroom has to be a double bedroom.

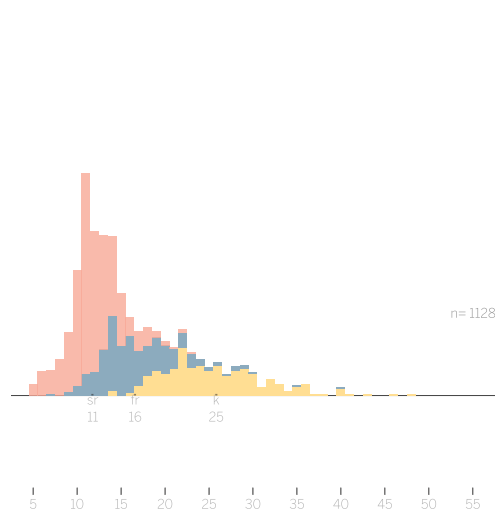
The average size of primary rooms increases in proportion to the number of habitable rooms in a dwelling. While the primary room in dwellings with a separate kitchen in a 2HR dwelling is on average 17m², it is 19 m² for 3HR, and 20 m² for 4HR and 5HR dwellings. Similarly, the primary room in dwellings with a combined kitchen in a 2HR dwelling is on average 27 m², it is 30 m² for 3HR, and 38 m² for 4HR dwellings. This difference is consistent with the prescribed minimum area for living, kitchen, and dining spaces. Overall, while 18% of primary rooms with combined kitchen and 7% of primary rooms fall below the prescribed space standards, 50% of secondary rooms are smaller than 11.5 m², the space standard for a double bedroom (Table 8).

For comparisons against built year, available space standards for bedrooms, living rooms, and kitchens were collated for each period from respective documents (reports, design guides, etc). Where room sizes were not specified in relevant space standards, the exemplary plans provided in the respective documents were measured, including the smallest and largest room sizes found (Table 6).

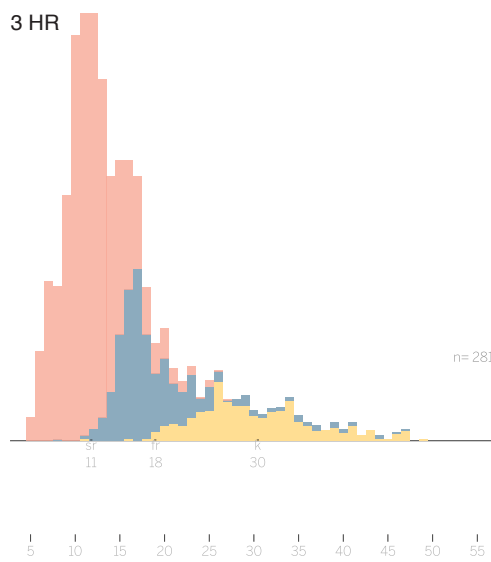
1 HR



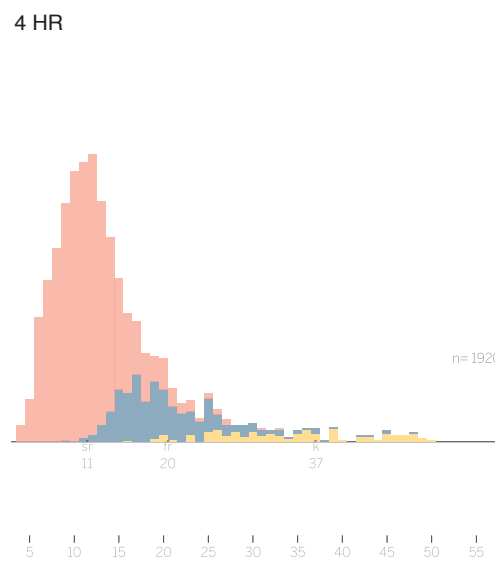
2 HR



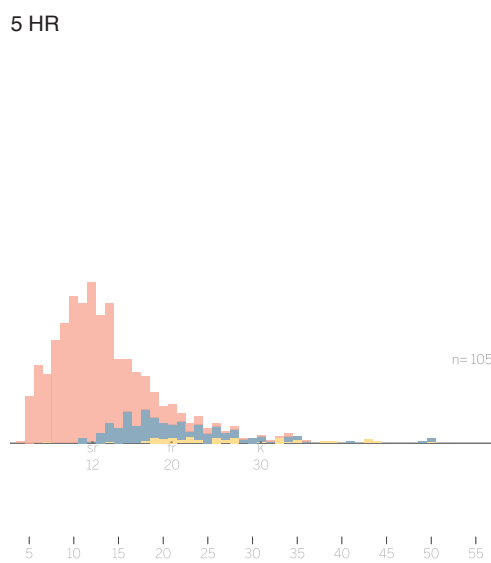
3 HR



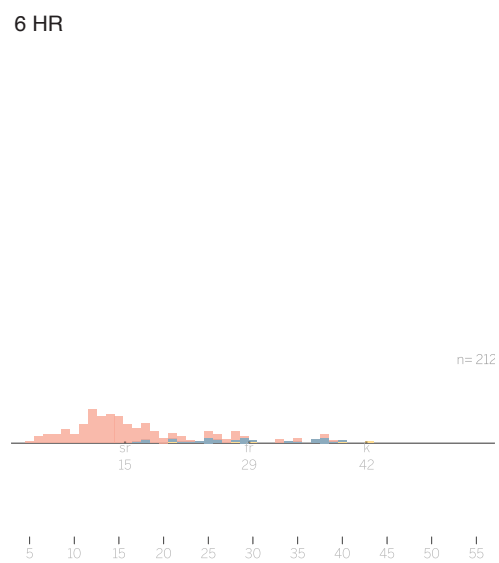
4 HR



5 HR



6 HR



Graph 16
Distribution of Primary and Secondary Room Sizes

Secondary rooms
Primary Rooms w/o kitchen
Primary rooms w/ kitchen

HR	Lowest			Highest		
	Kitchen + Dining	Living	Total	Kitchen + Dining	Living	Total
1	9.4	12	21			
2	9.4	12	21	10.4	13	23
3	10.4	13	23	12	14.8	27
4	11.2	14	25	14.4	17	31
5	12	14.8	27	16	19	35
6	12.8	16	29	18	21	39

Table 6
Space standards for primary rooms in London Housing Design Guide (2010).

HR	Year	Living + Dining		Living + Dining + Kitchen		Bedroom
		Lowest	Highest	Lowest	Highest	
3HR (2B2P; 2B3P; 2B4P)	1919					14.5
	1944	10.2	22.8	16.7	32.1	14
	1949					14
	1958					12.5
	1961					12.5
	2007					10
	2011	16.6	19.3	23	27	12
	2015	16.6	19.3	23	27	11.5
4HR (3B3P; 3B4P; 3B5P; 3B6P)	1919	16.7	16.7	26.3	37.5	14.5
	1944	10.2	22.8	16.7	32.1	14
	1949					14
	1958					12.5
	1961					12.5
	1977	13	18.5	18.5	29	
	1985					10.2
	2007					10
	2011	17.6	21.8	25	31	12
	2015	17.6	21.8	25	31	11.5

The space standards are derived from: 1919, Manual on the preparation of state-aided housing schemes; 1944, Housing Manual; 1949, Housing Manual; 1958, Flats and Houses: Design and Economy; 1961, Homes for Today and Tomorrow; 1977, GLC Preferred Dwelling Plans; 1985, Housing Act; 2007, Design and Quality Standards; 2011, London Housing SPG; 2015, Nationally Described Space Standards.

Table 7
Primary and secondary rooms compared to space standards in the London Housing Design Guide (2010).

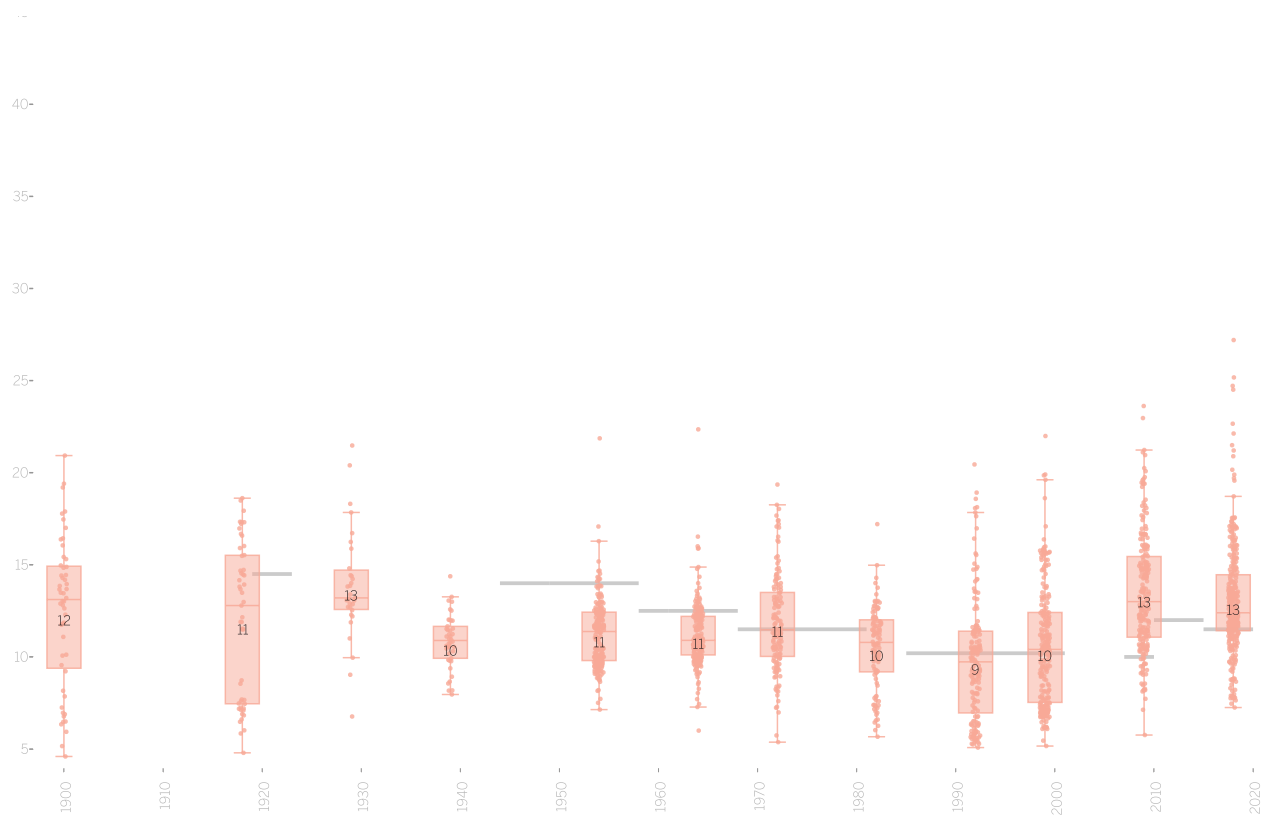
Below				Within		Above	
HR	n	n	%	n	%	n	%
w/ Kitchen							
1	29	3	10.3%	0	0.0%	26	89.7%
2	269	63	23.4%	43	16.0%	163	60.6%
3	355	42	11.8%	90	25.4%	222	62.5%
4	129	14	10.9%	33	25.6%	82	63.6%
5	46	24	52.2%	10	21.7%	12	26.1%
6	8	2	25.0%	1	12.5%	5	62.5%
	836	148	17.7%	177	21.2%	510	61.0%
w/o Kitchen							
1	32	9	28.1%	0	0.0%	23	71.9%
2	295	31	10.5%	10	3.4%	254	86.1%
3	583	18	3.1%	51	8.7%	514	88.2%
4	356	24	6.7%	89	25.0%	243	68.3%
5	171	25	14.6%	56	32.7%	90	52.6%
6	28	0	0.0%	5	17.9%	23	82.1%
	1465	107	7.3%	211	14.4%	1147	78.3%
Secondary Rooms							
1	0	0	0.0%			0	0.0%
2	564	285	50.5%			279	49.5%
3	1875	924	49.3%			951	50.7%
4	1435	786	54.8%			649	45.2%
5	841	414	49.2%			427	50.8%
6	176	39	22.2%			137	77.8%
	4891	2448	50.1%			2443	49.9%

Table 8
Primary and secondary rooms compared to space standards in the London Housing Design Guide (2010).

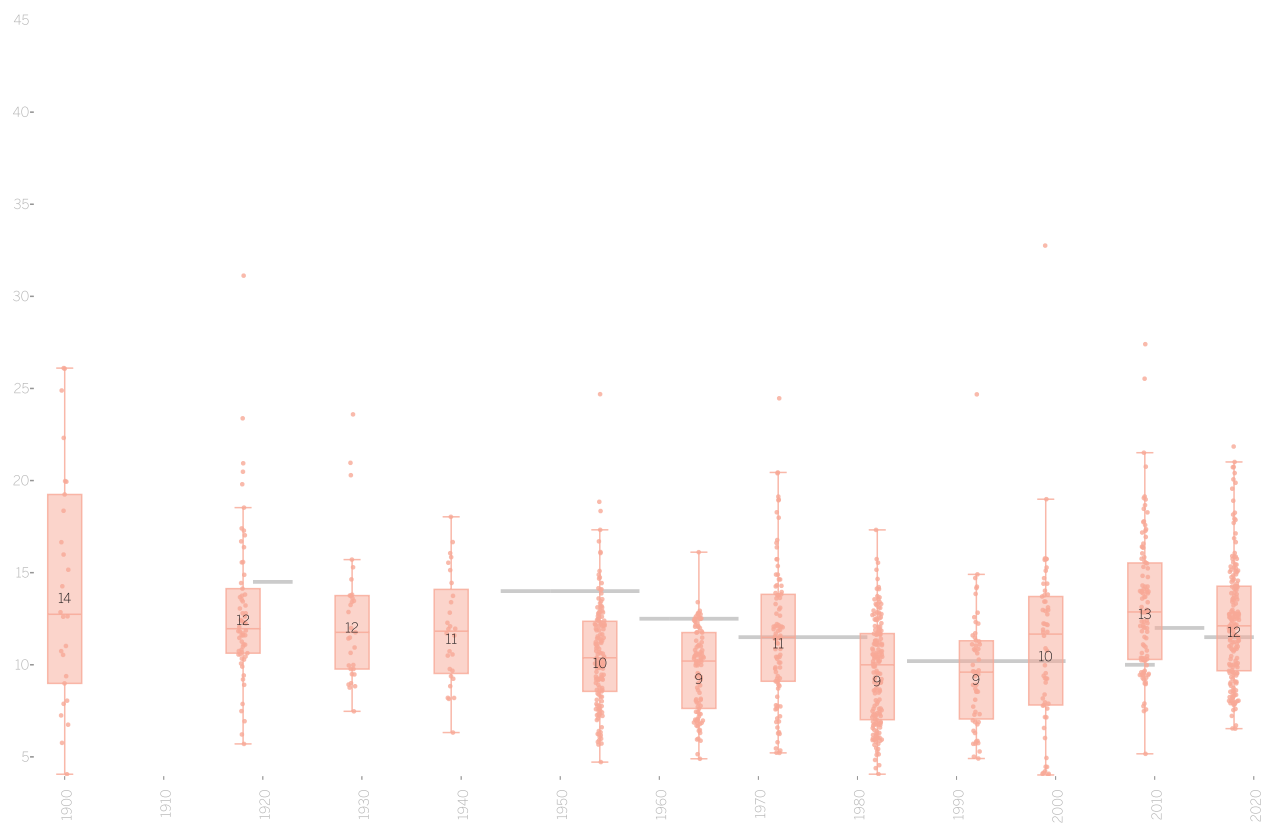
Secondary Rooms

Secondary rooms, which are typically the main bedrooms, are, on average, were just below the minimum bedroom dimensions in all periods. On average, secondary rooms range from 9 m² to 14 m² in 3HR and 4HR dwellings. Changes in bedroom space standards are reflected in the average size. Graphs 17 and 18 show an increase in space standards since 1985, with the average size of a bedroom increasing from 11 m² in the 1990s to 13 m² in the 2010s. In periods for which sufficient dwellings for comparison of both housing sectors were sampled, secondary rooms built by the public sector are on average 1 m² larger than private-sector ones (Graphs 19-22).

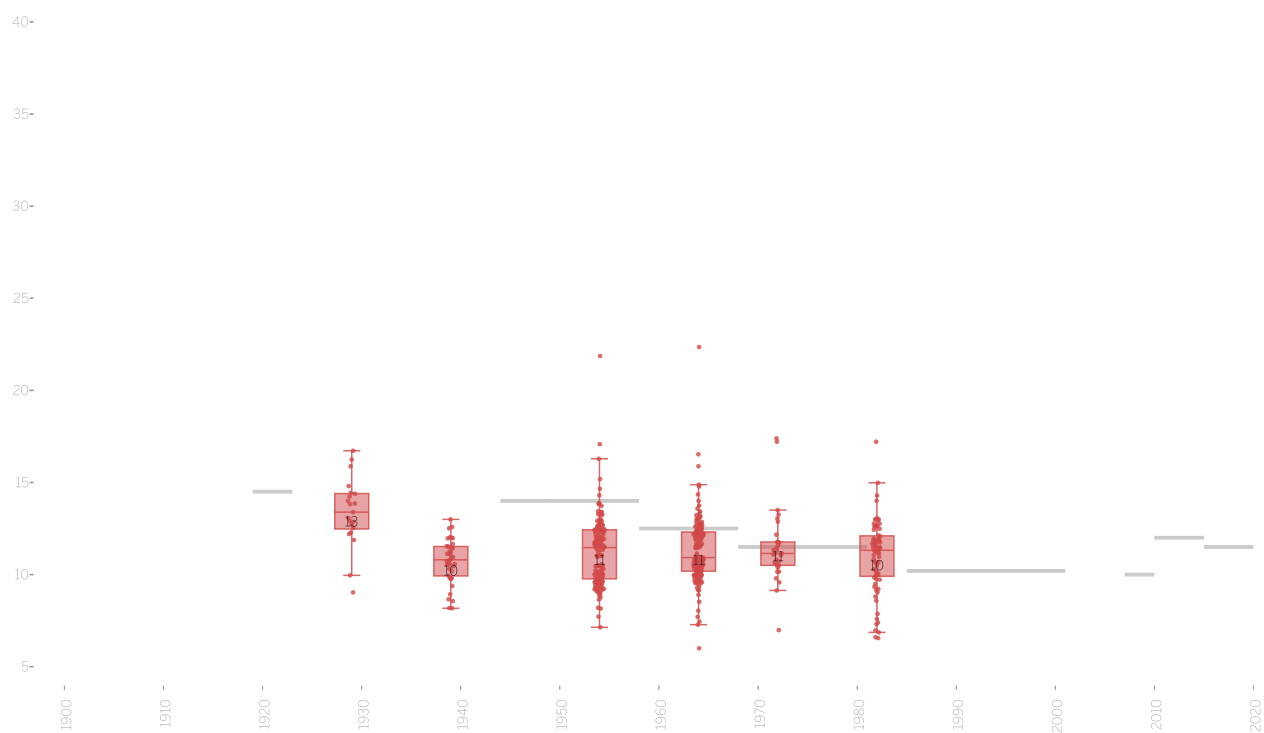
In summary, a relationship between space standards and bedrooms can be observed. However, this relationship is not linear and varies for different periods and housing tenures.



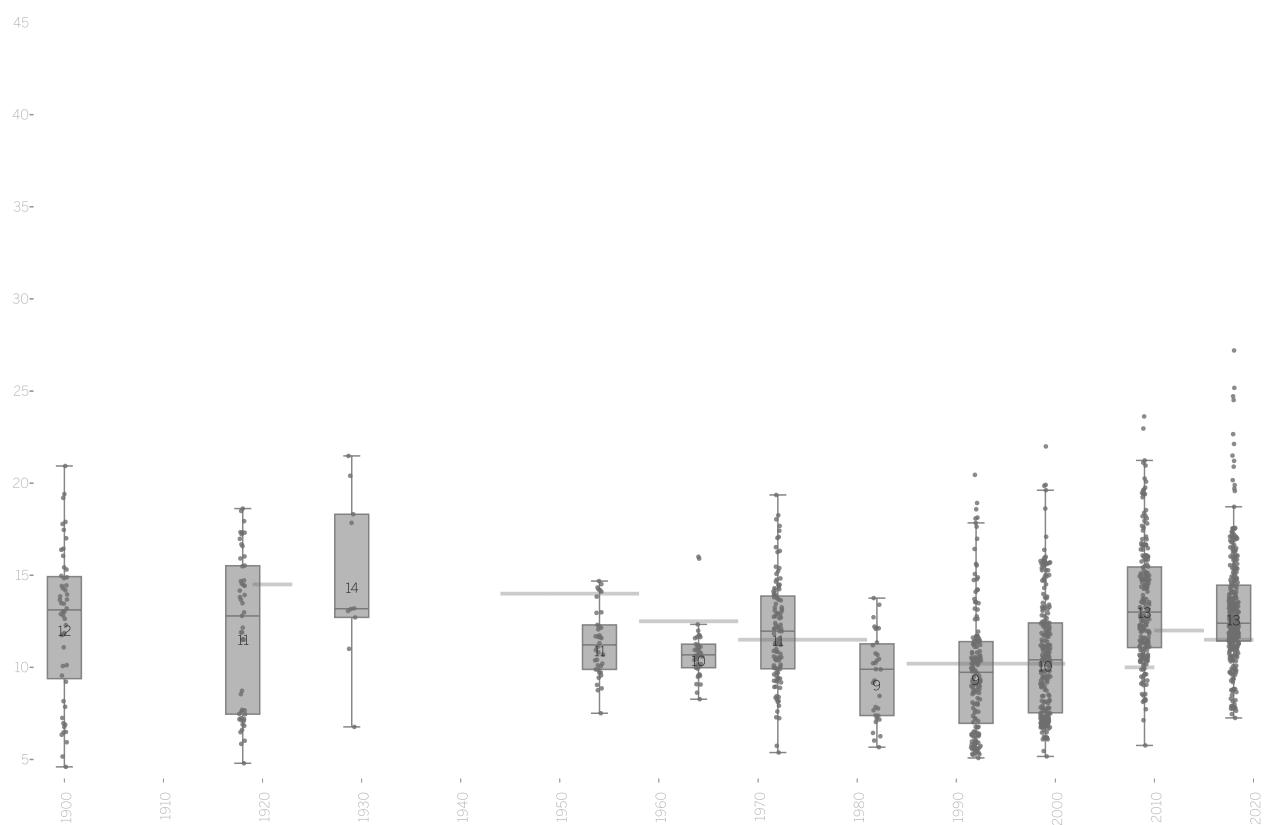
Graph 17
Distribution of Secondary Room Sizes in 3HR Dwellings per Built Year



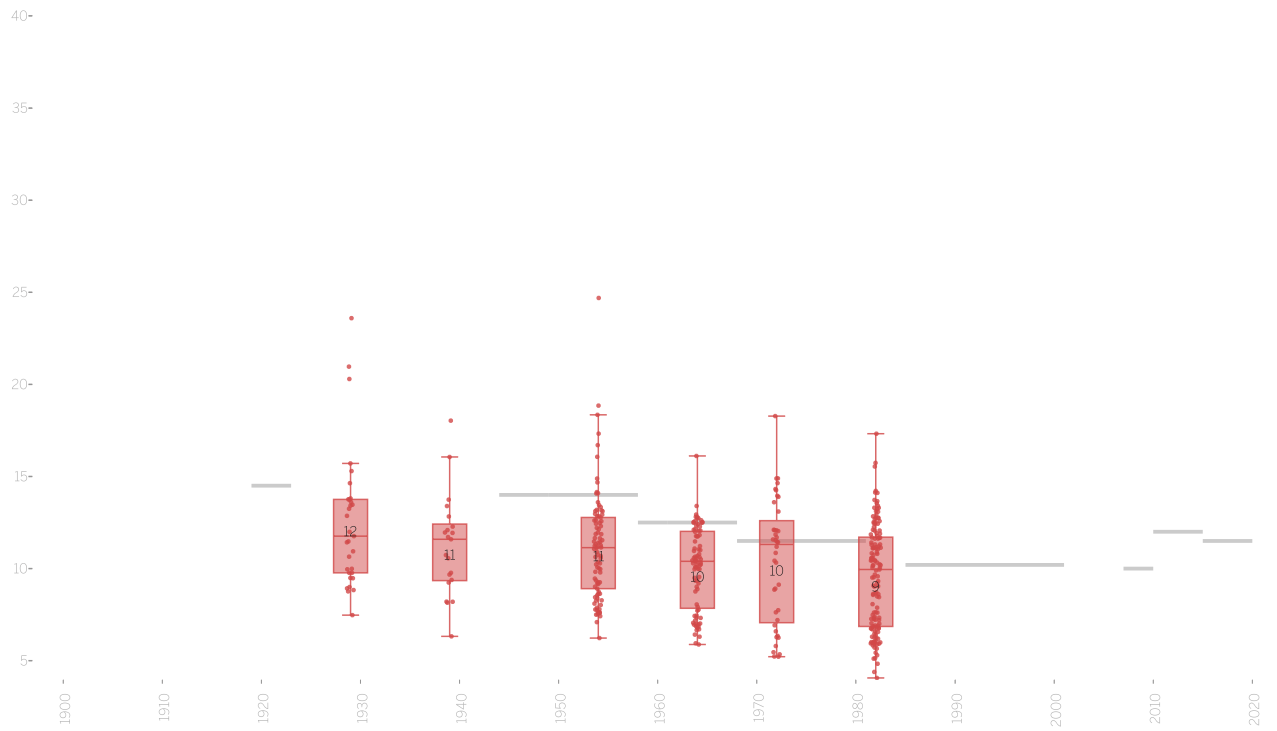
Graph 18
Distribution of Secondary Room Sizes in 4HR Dwellings per Built Year



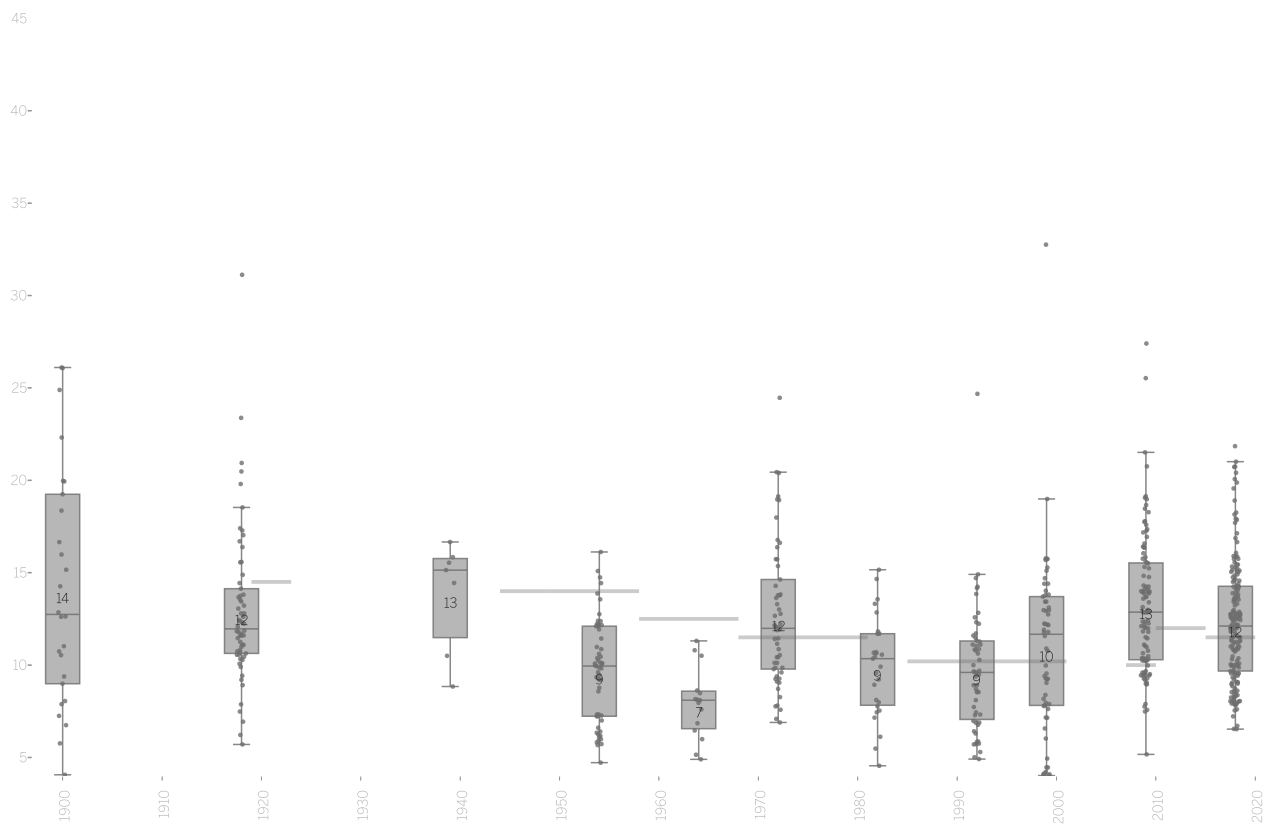
Graph 19
Distribution of Secondary Room Sizes in 3HR Public Built Dwellings per Built Year



Graph 20
Distribution of Secondary Room Sizes in 3HR Private Built Dwellings per Built Year



Graph 21
Distribution of Secondary Room Sizes in 4HR Public Built Dwellings per Built Year



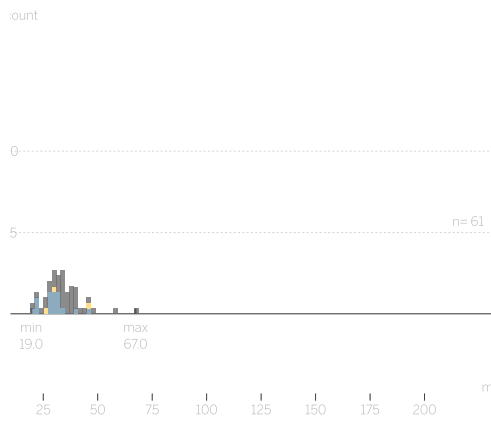
Graph 22
Distribution of Secondary Room Sizes in 4HR Private Built Dwellings per Built Year

Primary Rooms

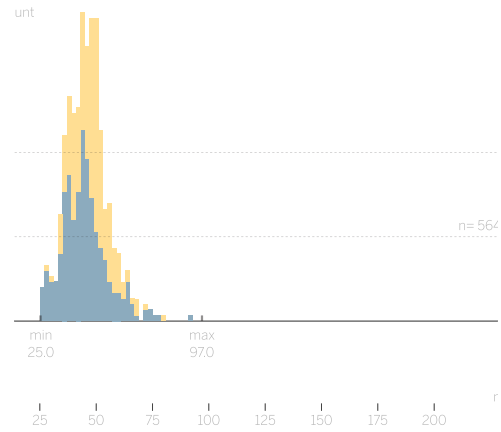
The mean size of primary rooms compared by kitchen types fluctuate across built year periods (Graphs 24-27). The average size of primary rooms without kitchens in 3HR dwellings range between 14 m² and 22 m², with an exceptional peak of 24 m² in the period 1965–1972. This is the result of dwelling layouts where the corridors and circulation spaces are merged with living areas. Similarly, primary rooms without kitchens in 4HR dwellings fluctuate in the range of 16 m² to 23 m². However, there was an exceptional peak of 25 m² in the period 1983–1992. The sample includes private mixed developments in South London from this period, which were built in the urban fringes with generous low-density layouts.

Until 2000, living rooms without kitchens were the main primary room type, but in the past two decades, living rooms combined with kitchens have become more common. While dwellings built since the 2000s combine kitchen, dining, and living rooms, especially flats, to reduce floor area and increase circulation efficiency, Graph 23 shows that combined living rooms are most common in 2HR and 3HR dwellings, particularly in larger units.

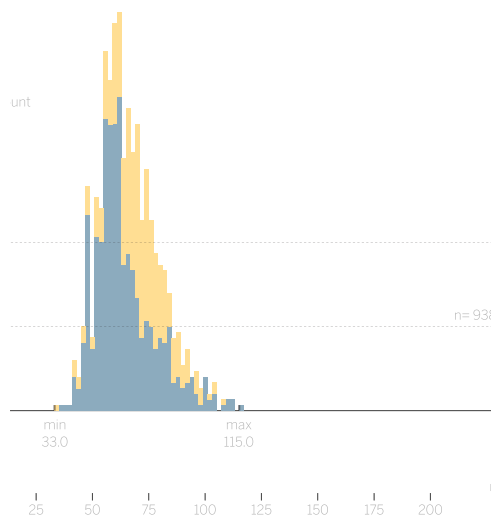
1 HR



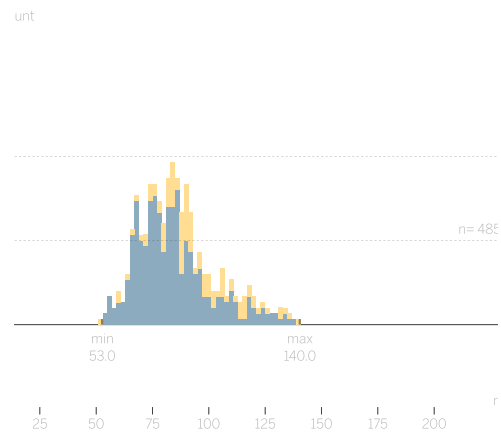
2 HR



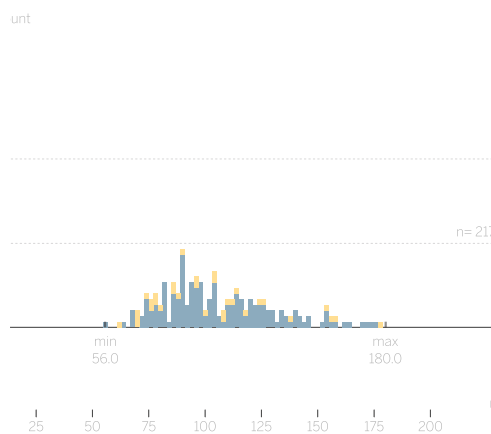
3 HR



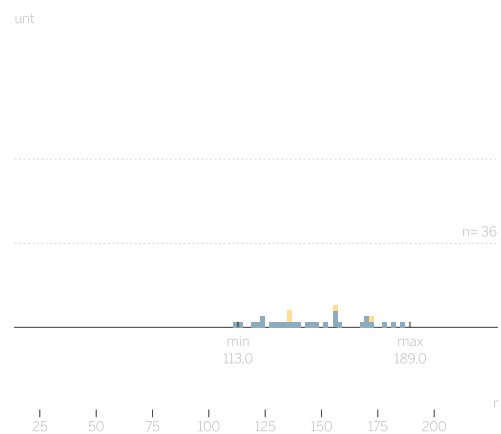
4 HR



5 HR

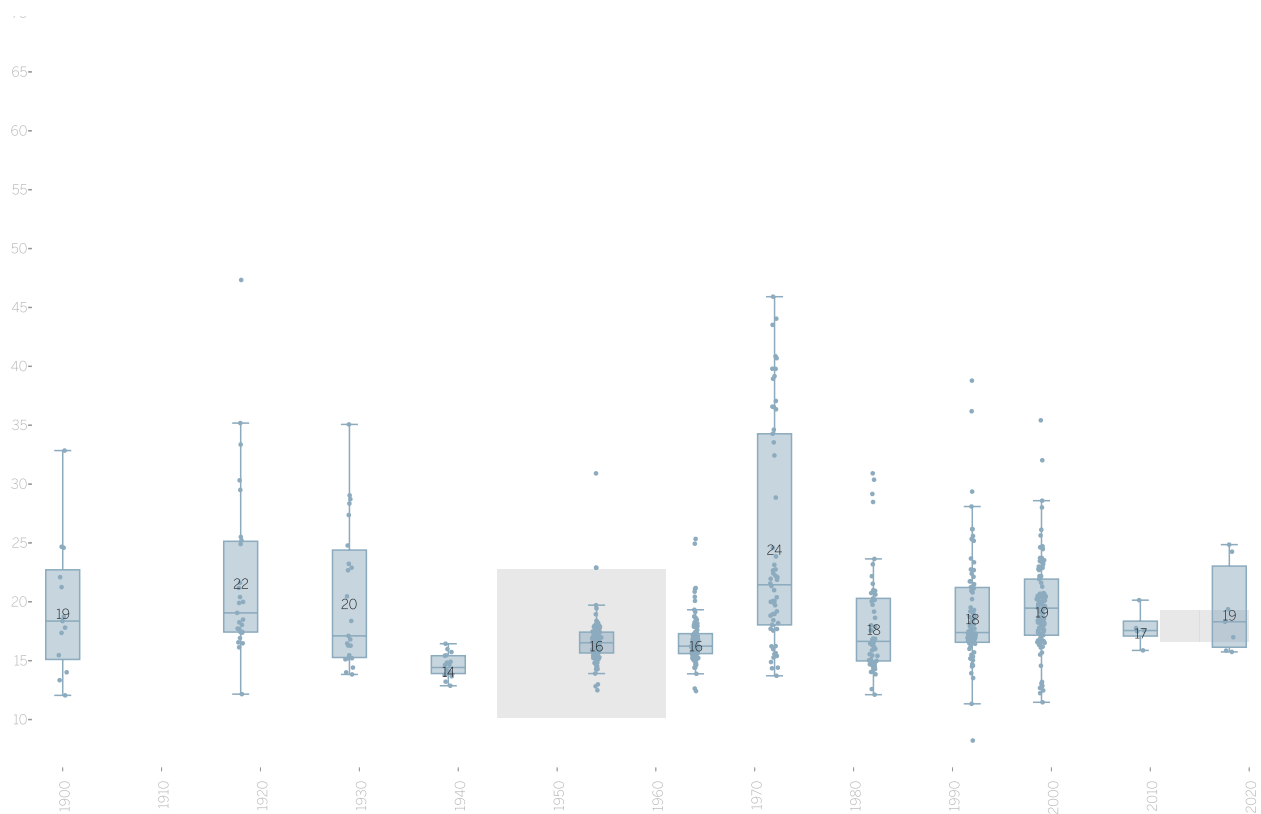


6 HR

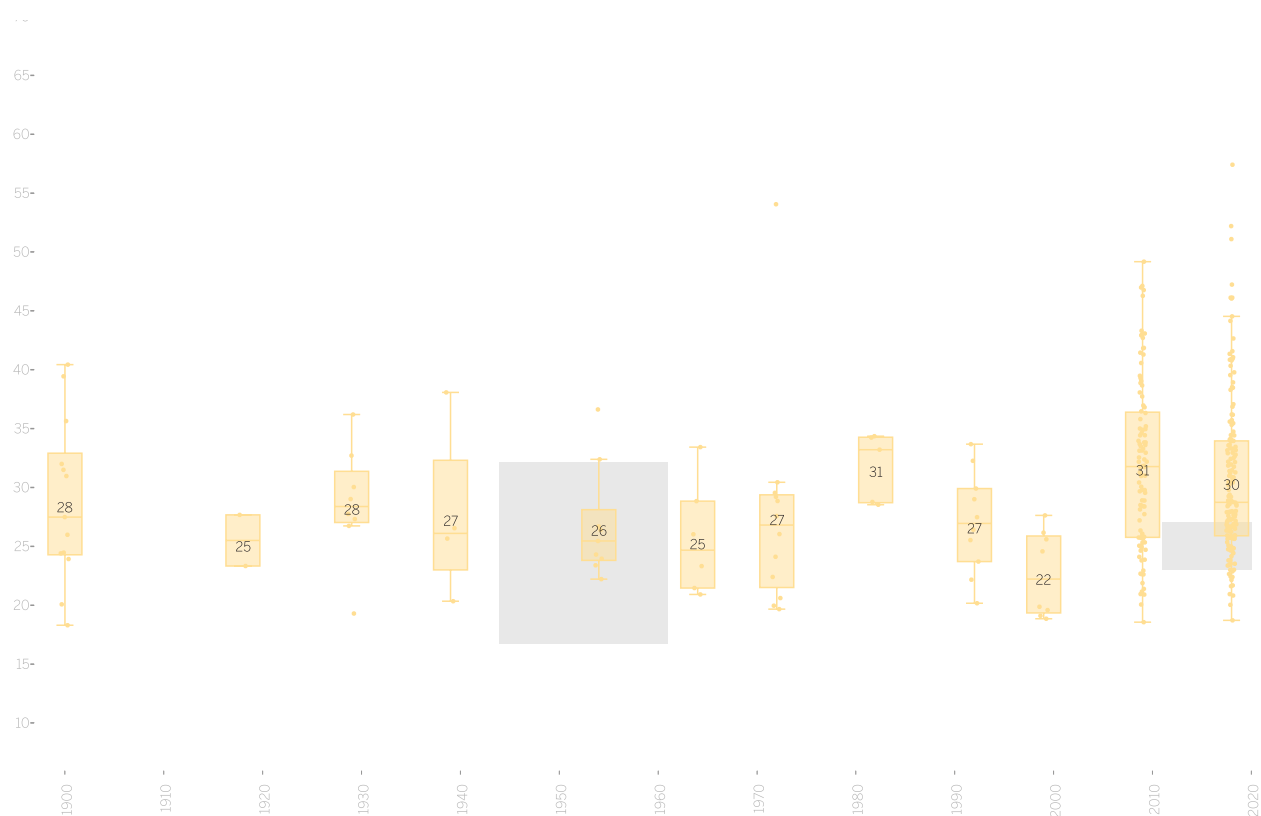


Graph 23
Distribution of Dwelling Floor Area per Number of Habitable Rooms per Kitchen Typology

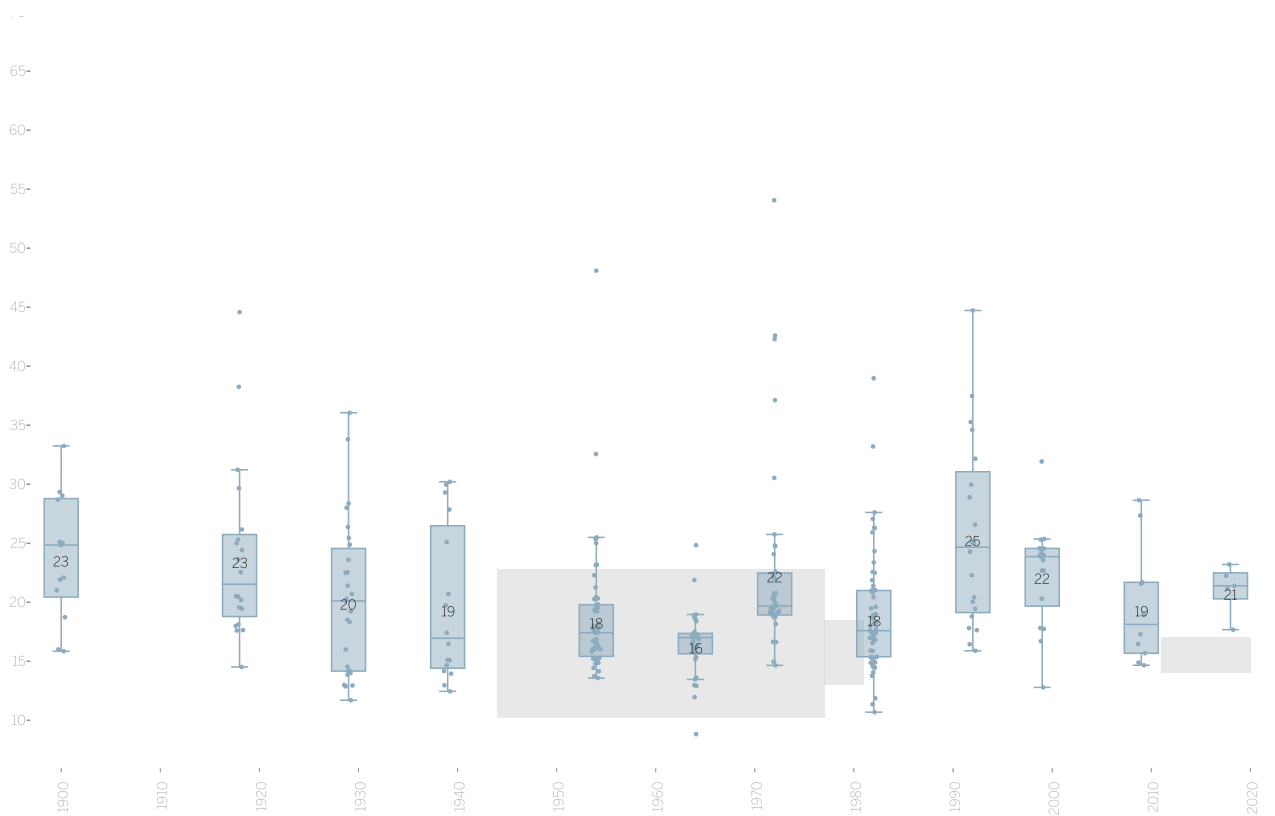
Primary rooms w/ kitchen
Primary rooms w/o kitchen



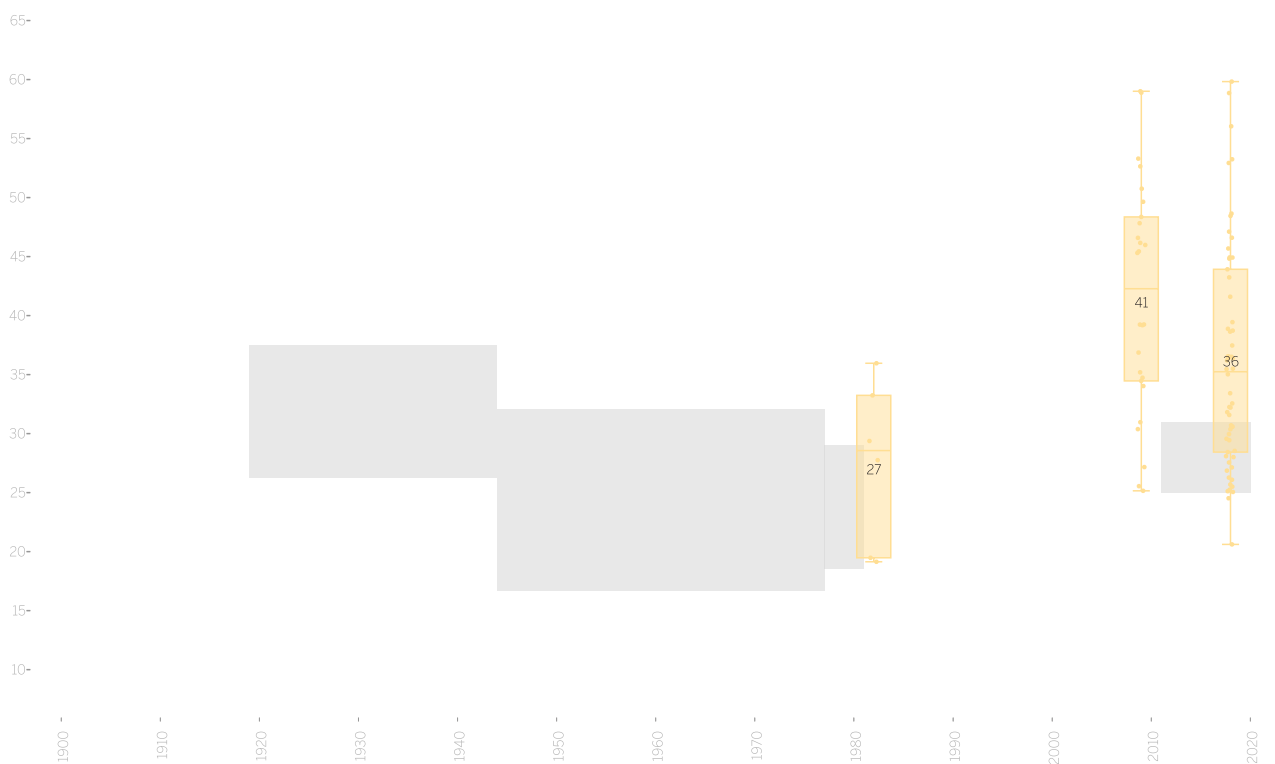
Graph 24
Distribution of Primary Room (w/o kitchen) Sizes in 3HR Dwellings per Built Year



Graph 25
Distribution of Primary Room (w/ kitchen) Sizes in 3HR Dwellings per Built Year



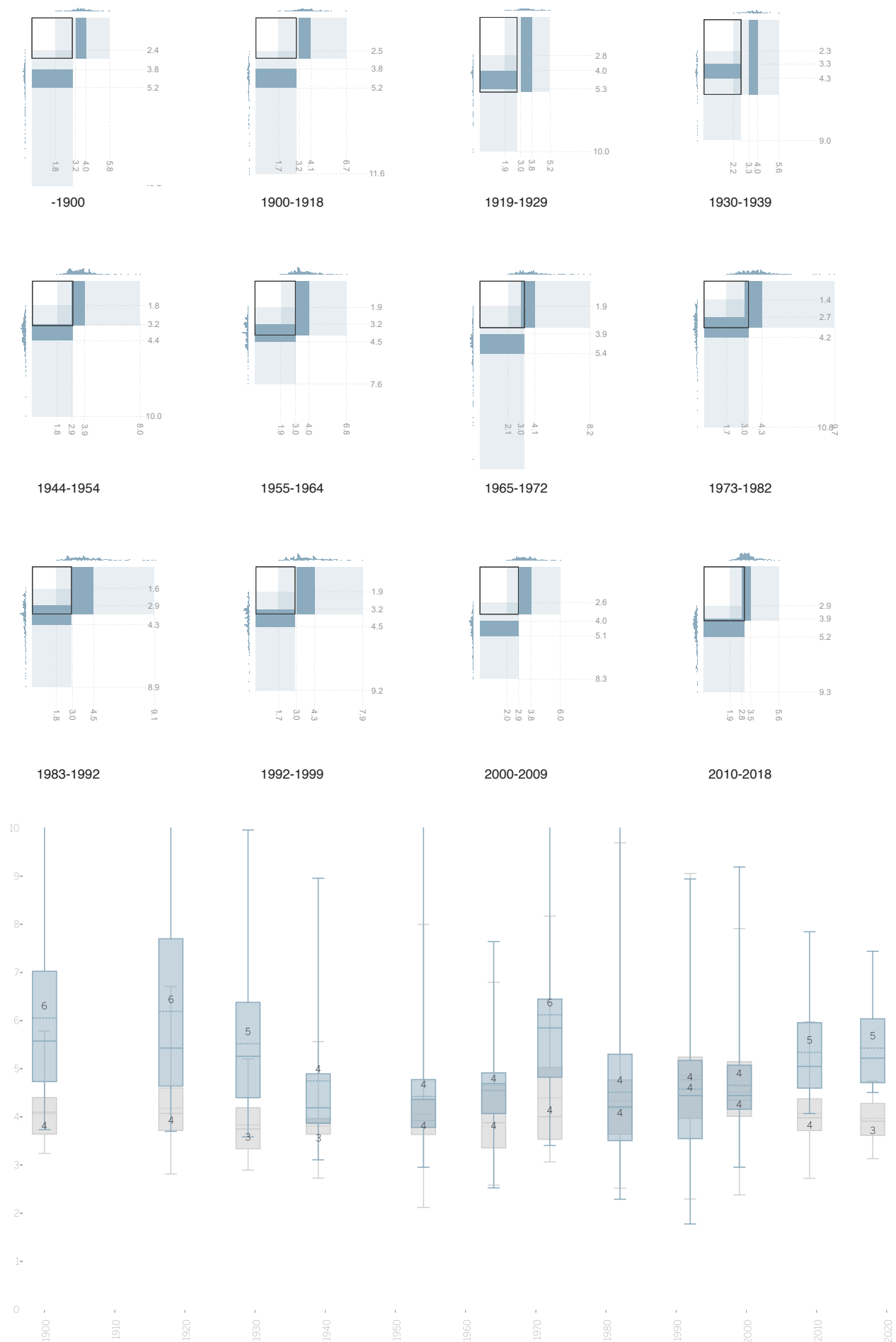
Graph 26
Distribution of Primary Room (w/o kitchen) Sizes in 4HR Dwellings per Built Year



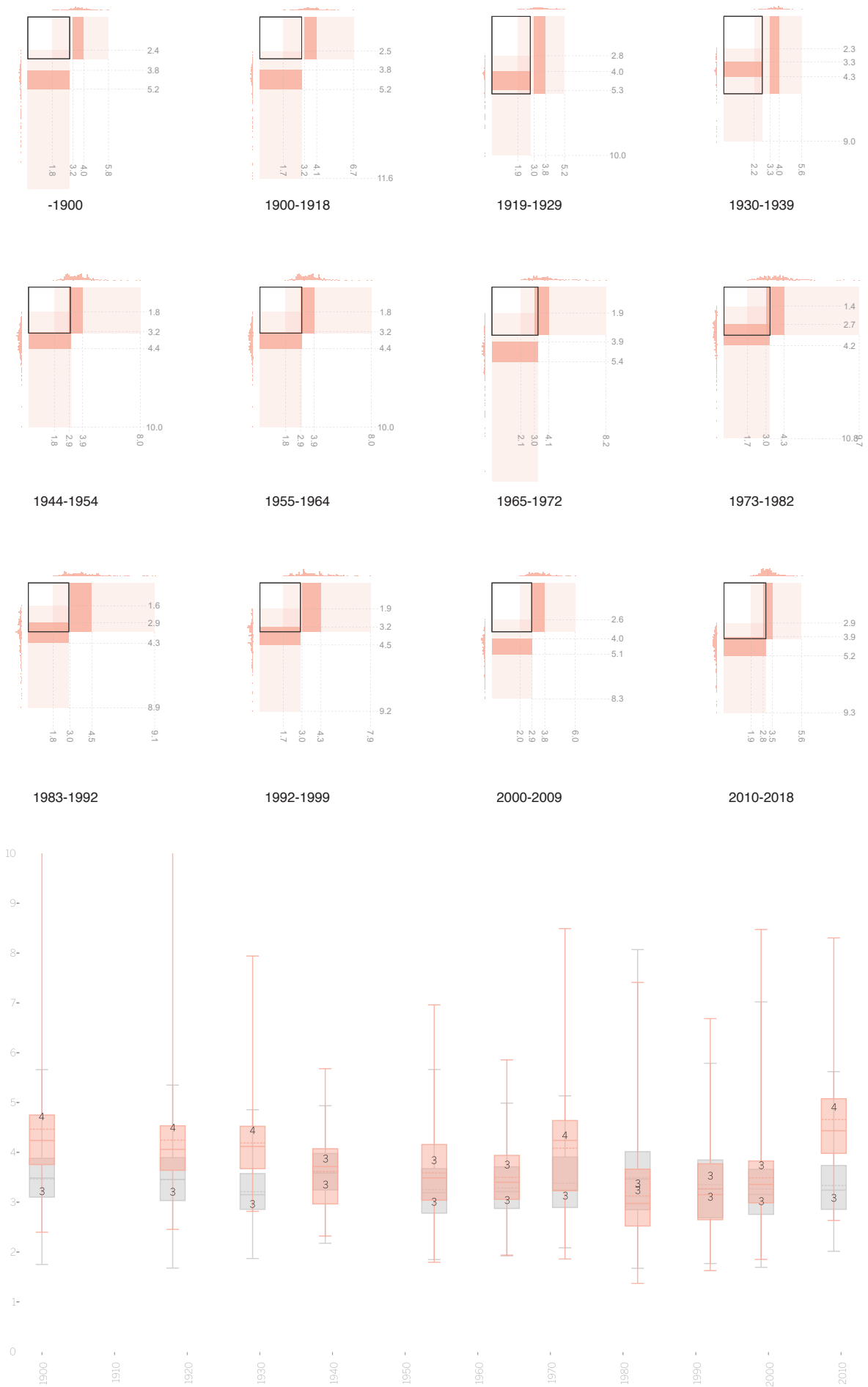
Graph 27
Distribution of Primary Room (w/ kitchen) Sizes in 4HR Dwellings per Built Year

Room Dimensions

Lastly, room dimensions were analysed based on their width and length derived from their minimum bounding box (Graphs 28-29). It shows that primary rooms are on average deeper in plan than secondary rooms, ranging from 4 m to 6 m, whereas secondary bedrooms have an average range of 3 m to 4 m in depth. Significantly, secondary bedrooms change very little across all built year periods and are standardised at 3 x 4 m.



Graph 28
Distribution of Primary Room Dimensions per Built Year



Graph 29
Distribution of Secondary Room Dimensions per Built Year

Conclusions: Dimensional Data Analysis

This chapter is a dimensional, morphological, and geometrical analysis of London's housing stock based on the detailed study of 1,707 dwelling unit plans and a larger sample of 4,421 against space standards. The analysis shows that changes in space standards are directly reflected in public-sector housing but also visible in private-sector ones, even though they have historically not been directly applied to private provisions. The analysis evidenced the effectiveness of space standards in defining the minimum usability and quality of homes as measured in terms of floor areas, dimensions, and furniture schedules, but also their shortcomings by reinforcing standardized housing solutions.

The historical research underpinning minimum space standards and decent home definitions has been shaped by changing social and cultural habits as well as advances in technology that influenced 'standard' or generalised housing expectations and user demands. Likewise, changing property type preferences are taken into account in the making of space standards. Space standards mirror general tendencies in dwelling size expectations as their calculation is based on what are assumed common living patterns and household compositions.

Space Standards and Dwelling Size

A key finding is that over a third (37%) of dwellings fail Nationally Described Space Standards (2015) with 63% of floor plans within or above current

12. Multiple-storey dwellings, small scale developments, private-sector built dwellings from 1945 to the 1980s, and public-sector built dwellings built after the 1980s are in comparison underrepresented in our current dataset.

14. Given that the samples are limited in covering lower-end private-sector housing in which many substandards dwellings can be found, it is likely that the number of units failing the space standard is higher. For instance, Ben Clifford et al (2020) have shown that in permitted development conversions from office to residential, where space standards do not apply, many dwellings fall below the minimum space standards.

15. The sample contains only public or social housing from the older stock. This is one of the shortcomings of sampling at LSOA level. As no social housing projects have been built at scale since the 1980s, the social housing in the sample are from large developments built before the 1980s.

16. Malcolm Morgan and Heather Cruickshank, 'Quantifying the Extent of Space Shortages: English Dwellings', Building Research & Information, 42.6 (2014).

17. The space standards in the London Design Guide (2010) were higher than in previous periods as dwellings built in the 2000s were larger. The sizes of terraced houses, which have been extended or subdivided into flats without being subjected to space standards, have mostly complied.

space standards. However, 44% fail space standards if only considering dwellings with two- to four-bedrooms (3HR to 5HR, 71% of all dwellings in the sample). The failure of meeting space standards is highest for studio flats (1HR), of which 70% are smaller than the space standards with just 30% meeting them. Yet 83% of one-bedroom dwellings meet space standards (23% of all dwellings in the sample). This number is even higher (95%) for five-bedroom units (6HR).¹⁴

Public-sector housing generally has been built to space standards and shows within each period very little variation in dwelling size.¹⁵ In contrast, private-sector housing has a great variation in size, with dwellings both smaller and larger than space standards. These variations mainly result from differences in the living areas (primary rooms), as secondary rooms (typically bedrooms) are largely standardised in terms of size and shape.

While around 50% of 'bedrooms' do not comply with space standards, especially in the private sector, there are different causes, including that these rooms were not intended for use as bedrooms. This warrants further study: How do space standards affect private sector housing and how do their occupants use what appears to be substandard dwellings? Does this affect how the quality of housing is perceived?

Surprisingly, a historical comparison shows that the average dwelling size has increased since the 1980s in London, a period in which there were mostly no space standards enforced. This contradicts other studies that found a decrease in the size of homes since the 1980s due to the lack of space standards but also increases in land cost and low subsidised housing production.¹⁶

However, data and findings are not directly comparable, as this study focused on London, whereas other studies such as the LABC's 'What is the Average House Size in the UK' looked at houses across the UK. London has a specific housing market and its housing differs from other regions in many ways, with development standards having been used there for a longer time than elsewhere.¹⁷ Moreover, previous RIBA research Case for Space (2011) into dwelling sizes found that developers operating nationally have been building larger units in London than in other parts of the UK. But the current Nationally Described Space Standards (2015) were taken from the London Design Guide (2010), making London housing standards an important national benchmark.

Housing Design and Layout

Given their reciprocal relationship, the analysis of space standards is effective for understanding general housing design expectations and measuring differences between housing morphologies and typologies in dimensional and quantifiable terms that are not immediately captured by conventional typological studies. For example, geometric and dimensional changes in dwelling footprint shapes over time, such as increases in the short-side to

long side ratio, and plan compactness mirror known changes and preferences in dwelling and building typologies. The relationship between morphology, compactness, and dimensions as an alternative way of defining building groups (conventionally classified as building typologies) could be further studied through a more detailed dataset that includes information on the building and unit-to-unit relationships.

Translated into quantifiable assessment criteria, space standards are not always good measures of housing design solutions or qualitative aims. The study reveals that space standards do not necessarily work well in the assessment of non-standard layouts, morphologies, and typologies. For instance, the proportion of dwellings failing space standards varies for different dwelling typologies (i.e. one- and two-storey dwellings) with the same number of habitable rooms. More two-storey dwellings – houses and maisonettes – fail space standards compared to flats. However, in most of these cases, the provided circulation areas are less than the minimum circulation space in multi-storey dwellings required by space standards. Therefore failing the space standards does not mean that habitable rooms are less usable or smaller but indicate floor area savings through the combination of circulation areas and rooms. However, issues of accessibility remain often problematic, even where minimum circulation space requirements are met.

This study makes apparent that many factors determining dwelling layouts are decided and designed at the building scale, such as access types and building morphologies. Therefore, data at the building and even the urban block scale could be included in future studies to better connect dwelling-with building-level analysis.

Housing Assessment

Space standards and dwelling layout have to be assessed together to understand real plan usability. Plan compactness is a good measure for assessing dwelling layouts against space standards beyond floor areas, as plans with a low compactness ratio can meet space standards but not the intended functional requirements and usability. Housing design policies and housing quality assessment should take into account plan forms and compactness ratios when enforcing space standards to ensure that the usability criteria are met fully.

While this assessment of housing shows how space standards can be complemented to ensure usability as defined by furniture dimensions and activity or circulation space, a fundamental issue of defining quality housing remains to be resolved. Little research has looked into how quantitative criteria affect housing quality and the diverse and often contradictory understandings of what housing quality means to different stakeholders or occupants. There is limited feedback between studies analysing how users measure the quality of their homes and what housing design needs and

expectations they have. Similarly, there are substantial gaps in understanding the social and cultural dimensions of housing expectations in the making of space standards. Cultural expectations and past housing experiences are strong drivers of housing choices and demands, both at individual and collective levels.

Functional requirements are based on furniture layouts, activity zones, dimensions, and daily routines, which in the UK were first systematically identified in mid-twentieth century studies. There is a substantial lack of new studies into current housing needs and use from an integrated design research and lived experience perspective that considers changing demographics. Only limited research exists on current housing use patterns in relation to new household compositions or how occupants perceive housing design quality or experience their homes. Especially the COVID-19 pandemic has led to significant changes in housing expectations with, for example, demand for larger dwellings growing.

Methodology

There is great potential in integrating dimensional, geometric, and data-driven analysis in design research to study housing outcomes and design processes. As the study shows, it supports a rethinking of conventional housing classifications and their analytical limitations, as it offers findings and evidence with direct relevance to design decisions. Beyond the current study, this should be expanded to deal with cross-scalar problems arising at the dwelling, building, and block scales.

There is also a need for establishing new design guidelines from a multidisciplinary perspective that complement space standards by grounding them both in a more comprehensive qualitative and quantitative evidence base. This might include studies of lived experiences as well as demographic statistics that can support evidence-based policymaking and design.

From a methodological perspective, a data-driven and quantitative approach has value for comparing and assessing housing outcomes at a large scale, which is useful for housing design and policy studies. It opens up potentially new methodologies capable of creating more directly tangible and actionable evidence to support design decisions and the value of design in housing.

However, the transferability of the current approach to context with very different regulatory regimes and cultures has to be further tested. For example, places like Hong Kong do not have established space standards, reinforcing the need for more studies exploring the problem of how space standards or their equivalent are determined, implemented, enforced and how this affects housing design outcomes and quality.

Appendix A

Year	LSOA	Description	Number of Housing Units Analysed
-1900	Hackney 012BCD	2, 3, 4 storey terraced houses, various frontages, in long terraces, private sector built	109
-1900	Hackney 020CDE	3 storey terraced houses, similar frontages, short terraces, private sector built	77
-1900	Hackney 06AC	2, 3, 4 storey terraced houses, various frontages, in long terraces, private sector built	53
1900-1918	Newham 24C25D	2 storey terraced houses, narrow frontages, in long terraces, private sector built	129
1900-1918	Westminster 006BC	Purpose-built mansion flats, private sector built	50
1919-1929	Camden 001B	Purpose-built mansion flats, private sector built	20
1919-1929	Hammersmith and Fulham 003C	2 storey terraced houses, narrow frontages, public sector built	59
1919-1929	Lewisham 37A26B	2 storey terraced houses, narrow frontages, public sector built	79
1930-1939	Lambeth 022E	Flats, public sector housing	16
1930-1939	Hackney 004B	Flats, public sector housing	9
1930-1939	Southwark 027A	Flats, public sector housing	21
1930-1939	Lambeth 035BC	2 storey terraced houses, wide frontages, private sector built	63
1945-1954	Islington 009B	purpose-built flats, core-access, public sector built	12
1945-1954	Westminster 024AB	purpose-built gallery-access flats, public sector built	73
1945-1954	Lambeth 031E	Flats, public sector housing	7
1945-1954	Lambeth 022D	Flats, public sector housing	2
1945-1954	Greenwich 031C	Houses, private-sector housing	11
1945-1954	Greenwich 031D	Houses, private-sector housing	16
1945-1954	Southwark 033C	Flats, public sector housing	9
1945-1954	Hammersmith and Fulham 025B	Flats, public sector housing	9
1945-1954	Wandsworth 023D	Mix of maisonettes and houses, private-sector housing	25
1945-1954	Westminster 017D	Flats, public sector housing	55
1945-1954	Greenwich 030E	Houses, private-sector housing	9
1955-1964	Camden 023ADE	purpose-built mixed-typology flats, public sector built	53
1955-1964	Lambeth 024C	Flats, public sector housing	9
1955-1964	Lambeth 009B	Maisonettes, public sector housing	3
1955-1964	Westminster 010A	Mix of houses and flats, public sector housing	23
1955-1964	Wandsworth 022D	Mix of houses and flats, public sector housing	41
1955-1964	Camden 017B	Mix of houses and flats, public sector housing	25

1955-1964	Greenwich 034A	Mix of houses and flats, public sector housing	9
1955-1964	Tower Hamlets 017C	Mix of houses and flats, public sector housing	9
1955-1964	Lambeth 006B	Flats, public sector housing	23
1955-1964	Wandsworth 022B	Flats, public sector housing	12
1965-1972	City of London 001AC	purpose-built mixed-typology flats and maisonettes, public sector built	161
1965-1972	Hackney 025B	purpose-built mixed-typology flats and maisonettes, public sector built	9
1965-1972	Wandsworth 001C	purpose-built mixed-typology flats and maisonettes, public sector built	21
1965-1972	Westminster 015C	purpose-built mixed-typology flats, private sector built	101
1965-1972	Lewisham 002D	purpose-built mixed-typology flats, private sector built	12
1965-1972	Haringey 002C	Mix of maisonettes and flats, public sector housing	7
1965-1972	Camden 019E	Mix of maisonettes and flats, public sector housing	17
1973-1982	Islington 004D	purpose-built mixed-typology maisonettes, public sector built	19
1973-1982	Kensington and Chelsea 021C	purpose-built flats, private sector built	8
1973-1982	Wandsworth 003D	purpose-built mixed-typology maisonettes, public sector built	10
1973-1982	Westminster 010G	purpose-built flats and maisonettes, private sector built	25
1973-1982	Lambeth 033B	Houses, public-sector housing.	14
1973-1982	Greenwich 001B	Houses, public-sector housing.	1
1973-1982	Greenwich 001C	Houses, public-sector housing.	1
1973-1982	Haringey 016A	mix of flats and maisonettes, public-sector housing	10
1973-1982	Islington 002A	Mix of flats, maisonettes, and houses, public-sector housing.	19
1973-1982	Westminster 009A	Mix of flats, maisonettes, public-sector housing.	3
1973-1982	Newham 032E	Mix of flats and houses, private-sector housing	1
1973-1982	Lambeth 024A	Houses, public-sector housing.	8
1973-1982	Newham 035A	Mix of flats and houses, private-sector housing	18
1973-1982	Islington 005C	Mix of flats, maisonettes, public-sector housing.	14
1973-1982	Wandsworth 013C	Houses, public-sector housing.	25
1973-1982	Greenwich 001A	Houses, private-sector housing	7
1973-1982	Greenwich 015D	Mix of flats, maisonettes, and houses, public-sector housing.	4
1973-1982	Haringey 015C	mix of houses and low-rise flats, built by GLC.	10
1973-1982	Hackney 013B	Flats, public-sector housing	5
1973-1982	Lambeth 016C	Houses, private-sector housing	17
1983-1992	Newham 035CD	purpose-built flats and houses, private sector built	28
1983-1992	Tower Hamlets 026A	purpose-built flats and houses, private sector built	63
1983-1992	Southwark 001B	Houses, private-sector housing	30
1983-1992	Lewisham 003A	low-rise flats, private-sector housing	25

1983-1992	Southwark 008D	Mix of houses and flats, private-sector housing	40
1983-1992	Southwark 013B	Mix of houses and flats, private-sector housing	26
1983-1992	Camden 019C	houses and low-rise flats, private-built	55
1993-1999	Greenwich 004C	purpose-built flats and houses, private sector built	21
1993-1999	Hackney 007C	purpose-built houses, private sector built	40
1993-1999	Wandsworth 026D	Mix of houses and flats, private-sector housing	141
1993-1999	Hackney 023E	Mix of houses and flats, private-sector housing	15
2000-2009	Wandsworth 002F	purpose-built flats and maisonettes, private sector built	68
2000-2009	Wandsworth 004G	purpose-built flats and maisonettes, private sector built	38
2000-2009	Newham 037H	purpose-built flats and houses, private sector built	20
2000-2009	Islington 006F	purpose-built flats and maisonettes, private sector built	50
2000-2009	Islington 011I	purpose-built flats, private sector built	28
2000-2009	Tower Hamlets 033B	purpose-built flats, private sector built	26
2010-2018	Wandsworth 002H	purpose-built flats, private sector built	23
2010-2018	Wandsworth 002B	purpose-built flats, private sector built	76
2010-2018	Newham 013E	purpose-built flats, private sector built	58
2010-2018	Newham 037E	purpose-built flats, private sector built	63
2010-2018	Islington 018E	purpose-built flats and maisonettes, private sector built	9
2010-2018	Tower Hamlets 018A	purpose-built flats and maisonettes, private sector built	35
2010-2018	Haringey 015D	purpose-built flats, private sector built	46
2010-2018	Hackney 002F	purpose-built flats, private sector built	65

For LSOAs after 1983, only type plans are analysed. Therefore, they cover more than 70% of all dwellings in the LSOAs.

Bibliography

‘Noel Park.’ *The Builder* 44, no.6 (30 June 1883), p. 874.

‘The Riverside Mansion.’ *The Builder* (31 August 1928), pp. 338-42.

Abercrombie, Sir Leslie Patrick. *Greater London Plan 1944: A report prepared on behalf of the Standing Conference on London Regional Planning*. London: H.M.S.O., 1944.

Addison, Christopher. *Housing, Town Planning, &c. Act (Addison Act)*. London: Ministry of Health, 1919.

Baker, T F T. *A History of the County of Middlesex: Volume 10, Hackney*. London: Oxford University Press, 1995.

Balchin, Paul N., and Maureen Rhoden. *Housing: The Essential Foundations*. London and New York: Routledge, 1998.

Barker, Paul. *Founders of the Welfare State*. Hants, England: Gower, 1986.

Beattie, Susan. *A Revolution in London Housing: LCC Housing Architects & Their Work 1893-1914*. London: The Architectural Press, 1980.

Binney, Marcus. *Town Houses: Urban Houses from 1200 to the Present Day*. New York: Whitney Library of Design, 1998.

Birkbeck, David and Stefan Kruczkowski. *Building for Life*. Building for Life Partnership: London: CADBE at Design Council, Design for Homes and Home Builders Federation, 2018.

Blanchett, Elisabeth. *Prefab Homes*. London: Shire Publications, 2014.

Boughton, John. *Municipal Dreams: The Rise and Fall of Council Housing*. London: Verso Books, 2018.

Bowie, Duncan. *Politics, Planning, and Homes in a World City*. New York: Routledge, 2010.

Bowley, Marian. *Housing and the State 1919-1944*. New York and London: Garland Publishing, 1985.

Bramley, Glen. *Housing Supply Requirements across Great Britain: For low income households and homeless people*. London: Crisis & London Housing Federation, 2017.

Brown, Frank E. ‘Analysing Small Building Plans: A Morphological Approach.’ In *The Social Archaeology of Houses*, edited by Ross Samson. Edinburgh: Edinburgh University Press, 1990.

- Bullock, Nicholas. 'Plans for Post-war Housing in the UK: The Case for Mices-Development and the Flat.' *Planning Perspectives* 2, no. 1 (May 2007), pp. 71-98.
- Bullock, Nicholas. *Building the Post-War World: Modern Architecture and Reconstruction in Britain*. London: Routledge, 2002.
- Burnett, J. *A Social History of Housing 1815-1985*. London and New York: Methuen, 1986.
- Burns, Leland S. and Leo Grebler. *The Housing of Nations*. London: Macmillan Press, 1977.
- Burt Committee. *Housing (Temporary Accommodation) Act*. London: Ministry of Reconstruction, 1944.
- Caffyn, Lucy. *Workers' Housing in West Yorkshire, 1750-1920*. London: Her Majesty's Stationery Office, 1986.
- Campbell, Kenneth and Greater London Council. *Home Sweet Home Housing Designed by the London County Council and Greater London Council Architects 1888-1975*. London: Academy Editions, 1976.
- Carmona, Matthew, and Claudio de Magalhaes. 'Local environmental quality: establishing acceptable standards in England.' *The Town Planning Review* 80, no. 4/5 (2009), pp. 517-548.
- Central Housing Advisory Committee, and Sub-Committee on the Design of Dwellings. *Design of Dwellings*. London: Ministry of Health, 1944.
- Chey, Katy. *Multi-Unit Housing in Urban Cities: From 1800 to Present Day*. New York: Routledge, 2017.
- Clark, Greg. *The Making of a World City: London 1991 to 2021*. Chichester: Wiley Blackwell, 2015.
- Colquhoun, Alan. 'Typology and Design Method.' *Perspecta* 12 (1969), pp. 71-74.
- Colquhoun, Ian. *RIBA Book of British Housing: 1900 to the Present Day*. London: Architectural Press, 2008.
- Communities and Local Government. *Building a Greener Future: Policy Statement*. London: Communities and Local Government Publications, 2007.
- Cowan, David. *Housing Law and Policy*. Cambridge: Cambridge University Press, 2011.
- Crawford, David, ed. *A Decade of British housing, 1963-1973*. London: Architectural Press, 1975.
- Cross, Richard. *Artizans' and Labourers' Dwellings Improvement Act (Cross' Acts)*. London: UK Parliament, 1875.
- Croydon Council. 'Scrutiny Investigation on Room Sizes in New Developments.' Findings and Recommendations. Accessed Jan 30, 2020.
- Dennis, Richard. 'Babylonian Flats' in Victorian and Edwardian London. *The London Journal* 33, no.3 (2008), pp. 233-247.

Department for Communities and Local Government. 'Housing in England: Overview.' <<https://www.nao.org.uk/wp-content/uploads/2017/01/Housing-in-England-overview.pdf>> [accessed Jan 15, 2020]

Department for Communities and Local Government. *Approved Document B Vol. 1: Fire Safety in Dwellings*. London: RIBA Publishing, 2010.

Department for Communities and Local Government. *Approved Document F: Ventilation*. London: RIBA Publishing, 2010.

Department for Communities and Local Government. *English Housing Survey: Housing Stock Report*. London: Department for Communities and Local Government, 2010.

Department for Communities and Local Government. *Housing Standards Review: Consultation*. London: Department for Communities and Local Government, 2013.

Department for Communities and Local Government. *Planning Policy Statement 3 (PPS3): Housing*. London: Department for Communities and Local Government, 2006.

Department for Communities and Local Government. *Technical Housing Standards - Nationally Described Space Standard*. London: Department for Communities and Local Government, 2015.

Design for London. *London Housing Design Guide: Interim Edition*. London: Mayor of London, 2010.

Digimap. 'Historic Roam.' EDINA. <<https://digimap.edina.ac.uk/historic>> [accessed June 20, 2020]

Disney, Richard, and Guannan Luo. *The Right to Buy Public Housing in Britain: A Welfare Analysis*. London: Institute for Fiscal Studies, 2016.

Drury, Andrew. 'Parker Morris – Holy Grail or wholly misguided?.' *Town & Country Planning Association Journal* 77, no.10 (October 2008): 403-406.

Drury, Andrew. *Standards and Quality in Development: A Good Practice*. London: National Housing Federation, 1998.

Dudley Committee. *Dudley Report: Design of Dwellings*. London: HMSO, 1944.

English Heritage. 'Chapter 12: Shaftesbury Park.' Survey of London. <https://www.ucl.ac.uk/bartlett/architecture/sites/bartlett/files/50.12_shaftesbury_park.pdf> [accessed Jan 14, 2020]

English Heritage. *Regeneration and the Historic Environment: Heritage as a catalyst for better social and economic regeneration*. London: English Heritage, 2005.

Enterprise Zones. 'What are Enterprise Zones?.' About. <<https://enterprisezones.communities.gov.uk/about-enterprise-zones/>> [accessed Jan 5, 2020]

Evans, Alan W, and Oliver Marc Hartwich. *Unaffordable Housing: Fables and Myths*. London: Policy Exchange Ltd, 2005.

Evans, Robin. *Translations from Drawing to Building and Other Essays*. London: Architectural Association, 2011.

- Forshaw, John H., and Patrick Abercrombie (London County Council). *County of London Plan*. London: Macmillan and Company for London County Council, 1943.
- Foster, Janet. *Docklands: Cultures in conflict, worlds in collision*. London: Routledge, 1999.
- Gallant, Nick, Manuela Madeddu, and Alan Mace. 'Internal Housing Space Standards in Italy and England.' *Progress in Planning* 74, no.1 (2010), pp. 1-52.
- Gayler, Hugh J. *Geographical Excursions in London*. Lanham, MD: University Press of America, 1996.
- Gleeson, James. *Housing in London 2015: The Evidence Base for the Mayor's Housing Strategy*. London: Greater London Authority, 2015.
- Gleeson, James, and Georgie Cosh. *Housing in London 2019: The Evidence Base for the Mayor's Housing Strategy*. London: Greater London Authority, 2019.
- Glendinning, Miles and Stefan Muthesius. *Tower Block: Modern Public Housing in England, Scotland, Wales and Northern Ireland*. New Haven: Yale University Press, 1994.
- Goldfinger, Erno and Ursula Blackwell. *Planning Your Neighbourhood: for home, for work, for play*. Air Ministry Directorate of Education Services, 1944.
- Goodchild, Barry, and Robert Furbey. 'Standards in Housing Design: A review of the main changes since the Parker Morris report (1961).' *Land Development Studies* 3, no.2 (1986), pp. 79-99.
- Goodchild, Barry. *Homes, Cities and Neighbourhoods: Planning and the Residential Landscapes of Modern Britain*. London: Routledge, 2016.
- GOV.UK: Housing, Local and Community. 'Guidance: Housing - optional technical standards.' Planning and Building. Accessed May 23, 2020. <https://www.gov.uk/guidance/housing-optional-technical-standards>.
- GOV.UK: Housing, Local and Community. 'Statutory Guidance: Technical Housing Standards - Nationally Described Space Standard.' Accessed May 24, 2020. <https://www.gov.uk/government/publications/technical-housing-standards-nationally-described-space-standard>.
- GOV.UK: Legislation. 'The Building Regulations 2010.' UK Statutory Instruments.
- Gray, Percy, and R. Russell. *The Housing Situation in 1960: An Inquiry Covering England and Wales*. London: HMSO, 1962.
- Great Britain, Local Government Board. *Manual on the preparation of state-aided housing schemes*. London: H.M. Stationery Office, 1919.
- Greater London Authority and HATC. *Housing Space Standards: A report by HATC Limited for the Greater London Authority*. London: Greater London Authority, 2006.
- Greater London Council. *Preferred Dwelling Plans*. London: Architectural Press, 1977.
- Greeves, Emily and Ellis Woodman. *Home/Away: Five British Architects Build Housing in Europe: The Development of Housing in Britain 1870-2008*. London: British Council, 2008.

Guillery, Peter, and David Kroll, ed. *Mobilising Housing Histories: Learning from London's Past*. London: RIBA Publishing, 2017.

Guillery, Peter. 'Waste and Place: Late 18th Century Development on Kingsland Road.' In *Hackney History: Volume Six*, edited by Isobel Watson. London: Friends of Hackney Archives, 2000.

Habinteg Housing Association, and Joseph Rowntree Foundation. *Lifetime Home Standards*. London: Greater London Authority, 1991.

Habinteg Housing Association. *Revised Lifetime Home Standards*. London: Greater London Authority, 2010.

Harding, Vanessa, and Philip Baker. *People in Place: Families, Households and Housing in Early Modern London*. London: Centre for Metropolitan History, Institute of Historical Research, 2008.

Harrison, Joanne. 'The Origin, Development and Decline of Back-to-Back Houses in Leeds, 1787-1937.' *Industrial Archaeology Review* 39, no.2 (2017), pp. 101-116.

Heckmann, Oliver, and Friederike Schneider. *Floor Plan Manual Housing*. Basel: Birkhauser, 2018.

Heynen, Hilde and Gülsüm Baydar, ed. *Negotiating Domesticity: Spatial Productions of Gender in Modern Architecture*. London: Routledge, 2005.

Historic England. *Domestic 3: Suburban and Country Houses - Listing Selection Guide*. London: English Heritage, 2011.

Hobhouse, Hermione, ed. 'Public Housing in Poplar.' *Survey of London: Volumes 43 and 44, Poplar, Blackwall and Isle of Dogs*. <<http://www.british-history.ac.uk/survey-london/vols43-4/pp37-54>>

Homes and Communities Agency. 'Housing Quality Indicators.' Accessed Jan 15, 2020. <<https://www.gov.uk/guidance/housing-quality-indicators>>

Housing Corporation. *Design and Contract Criteria*. London: Housing Corporation, 1983.

Imrie, Robert. *Accessible Housing: Quality, Disability and Design*. London: Routledge, 2006.

Investment Property Forum. *Mind the viability gap: Achieving more large-scale, build-to-rent housing*. London: Investment Property Forum, 2015.

Jensen, Finn. *The English Semi-Detached House: How and why the semi became Britain's most popular house-type*. Cambridgeshire: Ovolo Publishing, 2007.

Joseph Rowntree Foundation. 'The Evolution of Stock Transfer Housing Associations.' Reports. <www.jrf.org.uk/report/evolution-stock-transfer-housing-associations> [accessed Jan 31, 2020]

Joseph Rowntree Foundation. 'The Impact of Part M on the Design of New Housing.' Reports. <<https://www.jrf.org.uk/report/impact-part-m-design-new-housing>> [accessed July 11, 2020]

Karn, Valerie. 'Housing Standards.' In *Housing- Today and tomorrow (2nd Supplement to the guide to housing)*, edited by M. Smith. London: Housing Centre Trust, 1995.

Karn, Valerie A., and Linda Sheridan. *New Homes in the 1990s: A study of design, space and amenity in housing association and private sector production*. York: Joseph Rowntree Foundation and the University of Manchester, 1994.

Klatt, Bebbe, ed. *GLC/ILEA Architecture 1976-1988*. London: Architectural Press, 1986.

Knowles, C.C., and P.H. Pitt, *The History of Building Regulations in London, 1189-1972*. London: Architectural Press, 1972.

Leech, Roger H. 'The Prospect from Rugman's Row: The Row House in Late Sixteenth and Early Seventeenth-Century London.' *Archaeological Journal* 153, no.1 (2017), pp. 201-242.

Leopold, Ellen, and Donald Bishop. *Design philosophy and practice in speculative house building*. London: Building Economics Research Unit, 1981.

Levitt, David, and Jo McCafferty. *The Housing Design Handbook: A Guide to Good Practice*. London: Routledge, 2019.

Lofthouse, Pamela. 'The Development of the English Semi-detached House: 1750-1950.' MA diss., University of York, 2012.

London Assembly. 'What Are Opportunity Areas?.' Planning. Accessed Nov 25, 2015.

London Datastore. 'Number and Density of Dwellings by Borough (2018).' Ministry of Housing, Communities & Local Government.

London Plan Team. *The Draft London Plan - consolidated changes version*. London: London Plan Team, 2019.

Lund, Brian. *Housing Politics in the United Kingdom: Power, Planning and Protest*. Bristol: Policy Press, 2016.

M'Sirdi, Nacer. *Sustainability in Energy and Buildings: Proceedings of the 3rd International Conference on Sustainability in Energy and Buildings*. New York: Springer, 2012.

Madigan, Ruth, and Joanne Milner. 'Access for All: Housing Design and the Disability Discrimination Act 1995.' *Critical Social Policy* 19, no. 60 (1999), pp. 396-409.

Malpass, Peter and Alan Murie. *Housing Policy and Practice*. Basingstoke: Palgrave, 2001.

Manoochehri, Jamileh. *The Politics of Social Housing in Britain*. New York: Peter Lang, 2012.

Mayor of London. *Housing in London 2014*. London: Greater London Authority, 2014.

Mayor of London. *Housing Supplementary Planning Guidance*. London: Greater London Authority, 2016.

Mayor of London. *London Housing: Supplementary Planning Guidance (SPG)*. London: Greater London Authority, 2012.

- Mayor of London. *The Draft London Plan - consolidated changes version*. London: Greater London Authority, 2019.
- Mayor of London. *The London Plan*. London: Greater London Authority, 2016.
- Miller, Mervin. *English Garden Cities*. London: English Heritage, 2010.
- Ministry of Health and Ministry of Works. *Housing Manual*. London: Ministry of Health and Ministry of Works, 1944.
- Ministry of Health and Ministry of Works. *Housing Manual*. London: H.M.S.O., 1949.
- Ministry of Housing and Local Government. *Design Bulletin vol. 6: Space in the Home*. London: Ministry of Housing and Local Government, 1963.
- Ministry of Housing, Communities & Local Government. *English Housing Survey 2018-19: Size of English Homes*. London: Ministry of Housing, Communities & Local Government, 2019.
- Ministry of Housing, Communities, and Local Government. *English Housing Survey: Floor Space in English Homes – main report*. London: Ministry of Housing, Communities, and Local Government, 2018.
- Morgan, Malcolm and Heather Cruickshank. 'Quantifying the extent of space shortages: English dwellings.' *Building Research & Information* 42, no.6 (2014), pp. 710-724.
- Mullins, David, and Alan Murie. *Housing Policy in the UK*. London: Palgrave, 2006.
- Muthesius, Hermann. *The English House*. London: Crosby Lockwood Staples, 1979.
- Muthesius, Stefan. *The English Terraced House*. New Haven: Yale University Press, 1982.
- National Building Agency. *Generic Plans*. London: National Building Agency, 1965.
- NHBC Foundation. *Homes Through the Decade: The making of modern housing*. NHBC Foundation, 2015.
- Office for National Statistics. 'Families and Households in the UK: 2017.' Families.
- Office of Population Censuses and Surveys. *General Household Survey*. London: HMSO, 1971.
- Park, Julia. *One Hundred Years of Housing Space Standards: What Now?*. London: Levitt Bernstein, 2017.
- Parker Morris Committee. *Parker Morris Report: Homes for Today and Tomorrow*. London: Ministry of Housing and Local Government, 1961.
- Parliament of the United Kingdom. *Artizans and Labourers Dwellings Act (Torrens' Act)*. London: H.M.S.O., 1868.
- Parliament of the United Kingdom. *Building Act*. London: H.M.S.O., 1984.
- Parliament of the United Kingdom. *Housing Act (Right to Buy)*. London: H.M.S.O., 1980.

- Parliament of the United Kingdom. *Housing Act*. London: H.M.S.O., 1988.
- Parliament of the United Kingdom. *Housing Finance Act*. London: H.M.S.O., 1972.
- Penner, Barbara. *Bathroom*. London: Reaktion Books, 2014.
- Pepper, Simon and Peter Richmond. 'Stepney and the Politics of High-Rise Housing: Limehouse Fields to John Scurr House 1925–1937.' *The London Journal* 34, no.1 (2009), pp. 33-54.
- Pepper, Simon, and David Yeomans. 'Working Class Flats in the 1930s: Steel versus Concrete.' In *2nd International Conference of Construction History vol. 3*, edited by M. Dunkeld, 2515-2525. Cambridge: Construction History Society, 2016.
- Pepper, Simon, and Peter Richmond. 'Upward or Outward? Politics, Planning and Council Flats (1919-1939).' *The Journal of Architecture* 13, no.1 (February 2008): 53-90.
- Pepper, Simon. 'Ossulston Street: Early LCC Experiments in High-Rise Housing, 1925-29.' *The London Journal* 7, no.1 (1981), pp. 45-64.
- Pope, Rex. *War and Society in Britain 1899-1948*. London: Routledge, 2014.
- Porter, Roy. *London: A Social History*. Cambridge: Harvard University Press, 2001.
- Power, Anne. 'Does demolition or refurbishment of old and inefficient homes help to increase our environmental, social and economic viability?' *Energy Policy* 36, no.1 (2008), pp. 4487-4501
- Prefab Museum. 'A Short History of Prefabs - Building the Post-war World.' Content. Accessed June 24, 2020.
- Prince's Foundation for Building Community, *Housing London: A Mid-Rise Solution* (2014).
- Rao, Nirmala. *The Changing Role of Local Housing Authorities: An Interim Assessment*. York: Joseph Rowntree Foundation, 1991.
- Rasmussen, Steen Eiler. *London the Unique City*. Cambridge: The MIT Press, 1964.
- Ravetz, Alison. *Council Housing and Culture: The History of a Social Experiment*. London: Routledge 2001.
- Ravetz, Alison. *The Place of Home: English Domestic Environments 1914-2000*. London: Taylor & Francis, 2013.
- Reynolds, Liam. *Full House? How Overcrowded Housing Affects Families*. London: Shelter, 2005.
- RIBA. 'Pattern books: Creating the Georgian Ideal.' Knowledge. <<https://www.architecture.com/knowledge-and-resources/knowledge-landing-page/pattern-books-creating-the-georgian-ideal>> [accessed Jan 14, 2020]
- RIBA. *Space standards for homes report: #Homewise*. London: RIBA, 2015.
- Roberts, Henry. *The Dwellings of the Labouring Classes*. London: Seeleys, 1850.

Rodger, Richard. *Housing in urban Britain 1780-1914*. Cambridge: Cambridge University Press, 1995.

Rogers, Richard George. *Towards an urban renaissance: Final Report of the Urban Task Force*. London: Taylor & Francis, 2004.

Saint, Andrew. *Politics and the People of London: the London County Council, 1889-1965*. London: Hambledon, 1989.

Sarigiannis, Dimosthenis A.. *Combined or multiple exposure to health stressors in indoor built environments*. Bonn, Germany: WHO Regional Office for Europe, 2013.

Schneider, Tatjana, and Jeremy Till. *Flexible Housing*. Oxford: Architectural Press, 2007.

Scott, Peter. *The Making of the Modern British Home: The Suburban Semi and Family Life Between the Wars*. Oxford: Oxford University Press, 2013.

Segal, Walter, and London County Council. *Housing: A Survey of the Post War Housing Work of the London County Council, 1945-1949*. London: London County Council, 1949.

Shepherd, Janet. *The 1950's Home*. Stroud: Amberley Publishing, 2017.

Sheppard, F H W, ed. *Survey of London: Volumes 31 and 32, St James Westminster, Part 2*. London: London County Council, 1963.

Sheppard, F. H. W., ed. *Survey of London: Volume 27, Spitalfields and Mile End New Town*. London: London County Council, 1957.

Steffel, R. Vladimir. 'The Slum Question: The London County Council and Decent Dwellings for the Working Classes, 1880-1914.' *Albion* 5, no.4 (1973): 314-325.

Steffel, R. Vladimir. 'The Boundary Street Estate: An Example of Urban Redevelopment by the London County Council, 1889-1914.' *The Town Planning Review* 47, no.2 (1976): pp. 161-173.

Stevenson, John. *British Society 1914-45*. London: Penguin Books, 1990.

Strange, Robert A., ed. *Common Lodging Houses Act and The Labouring Classes Lodging Houses Act (The Shaftesbury Act)*. London: Shaw and Sons, 1851.

Sutcliffe, Anthony, ed. *Multi-storey Living: The British Working-class Experience*. London: Croom Helm, 1974.

Swenarton, Mark. *Building the New Jerusalem: Architecture, Housing, and Politics, 1900-1930*. Bracknell, England: IHS BRE Press, 2008.

Swenarton, Mark. *Homes Fit for Heroes: The Politics and Architecture of Early State Housing in Britain*. London: Routledge, 2018.

Tarn, John Nelson. *Five Per Cent Philanthropy: An account of housing in urban areas between 1840 and 1914*. Cambridge: Cambridge University Press, 1973.

The Heritage Council. *Built to Last: The Sustainable Reuse of Buildings*. Dublin: The Heritage Council, 2004.

The Local Loans of England and Wales. *Housing of the Working Classes Act*. London: Woodfall and Kinder, 1885.

The Local Loans of England and Wales. *Housing of the Working Classes Act*. London: Woodfall and Kinder, 1890.

The National Affordable Homes Agency. *721 Housing Quality Indicators (HQI) Form*. London: Housing Corporation, 2007.

The National Archives. 'Housing and Town Planning Act 1919.' Legislation. Accessed March 4, 2020. <http://www.legislation.gov.uk/ukpga/1919/35/enacted>

Three Dragons. *London Plan Density Research: Lessons from Higher Density Development, Report to the GLA*. London: Greater London Authority, 2016.

Towers, Graham. *At Home in the City: Introduction to Urban Housing Design*. Oxford: Architectural Press, 2005.

Tudor Walters Committee. *Tudor Walters Report*. London: United Kingdom Parliament, 1918.

University of the West of England. '11 Post-War Housing, 1945-1960s - Introduction.' Domestic Architecture 1700 - 1960. Accessed Jan 15, 2020.

Unwin, Raymond. *Nothing Gained from Overcrowding*. London: Garden City and Town Planning Association, 1912.

Urban, Florian. *Tower and Slab: Histories of Global Mass Housing*. London: Routledge, 2011.

Vale, Brenda. *Prefabs: The History of the UK Temporary Housing Programme*. Abingdon, Oxon: Taylor and Francis, 2003.

Valuation Office Agency. 'Council Tax: Stock of Properties 2018.' GOV.UK. Last modified November 29, 2020.

Valuation Office Agency. 'Dwellings by Property Build Period and Type, LSOA and MSOA.' London Datastore.

Wandsworth Conservation & Design Group. *Totterdown Fields Conservation Area Appraisal & Management Strategy*. London: Wandsworth Council, 2008.

Watt, Paul. "It's not for us': Regeneration, the 2012 Olympics and the Gentrification of East London.' *City* 17, no.1 (2013), pp. 99-118.

Wohl, Anthony. *The Eternal Slum: Housing and Social Policy in Victorian London*. London: Arnold, 1977.

Yelling, J.A. *Slums and Slum Clearance in Victorian London*. London: Taylor & Francis, 2015.

Yorke, F. R. S., and Frederick Gibberd. *The Modern Flat*. London: Architectural Press, 1958.

