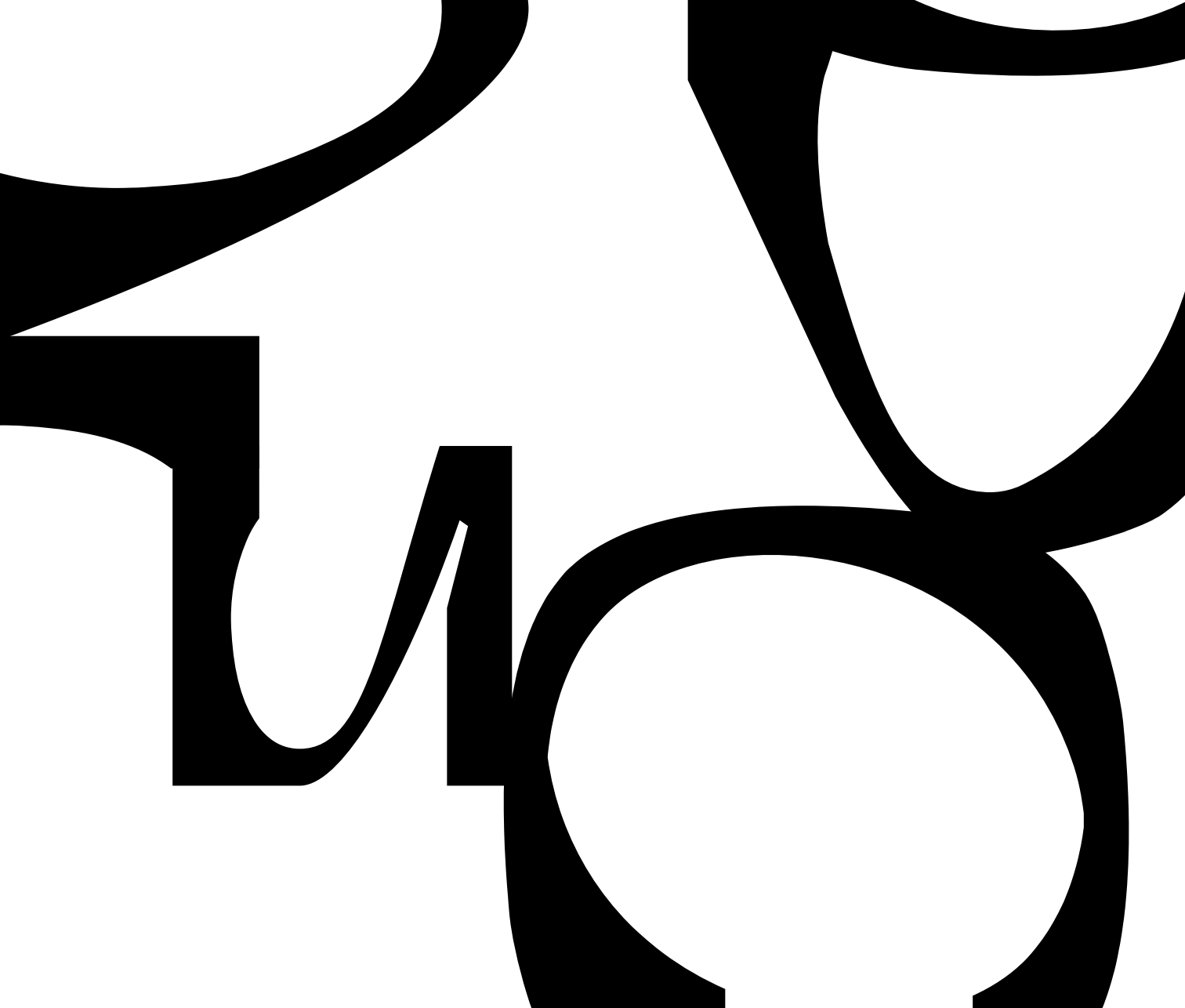
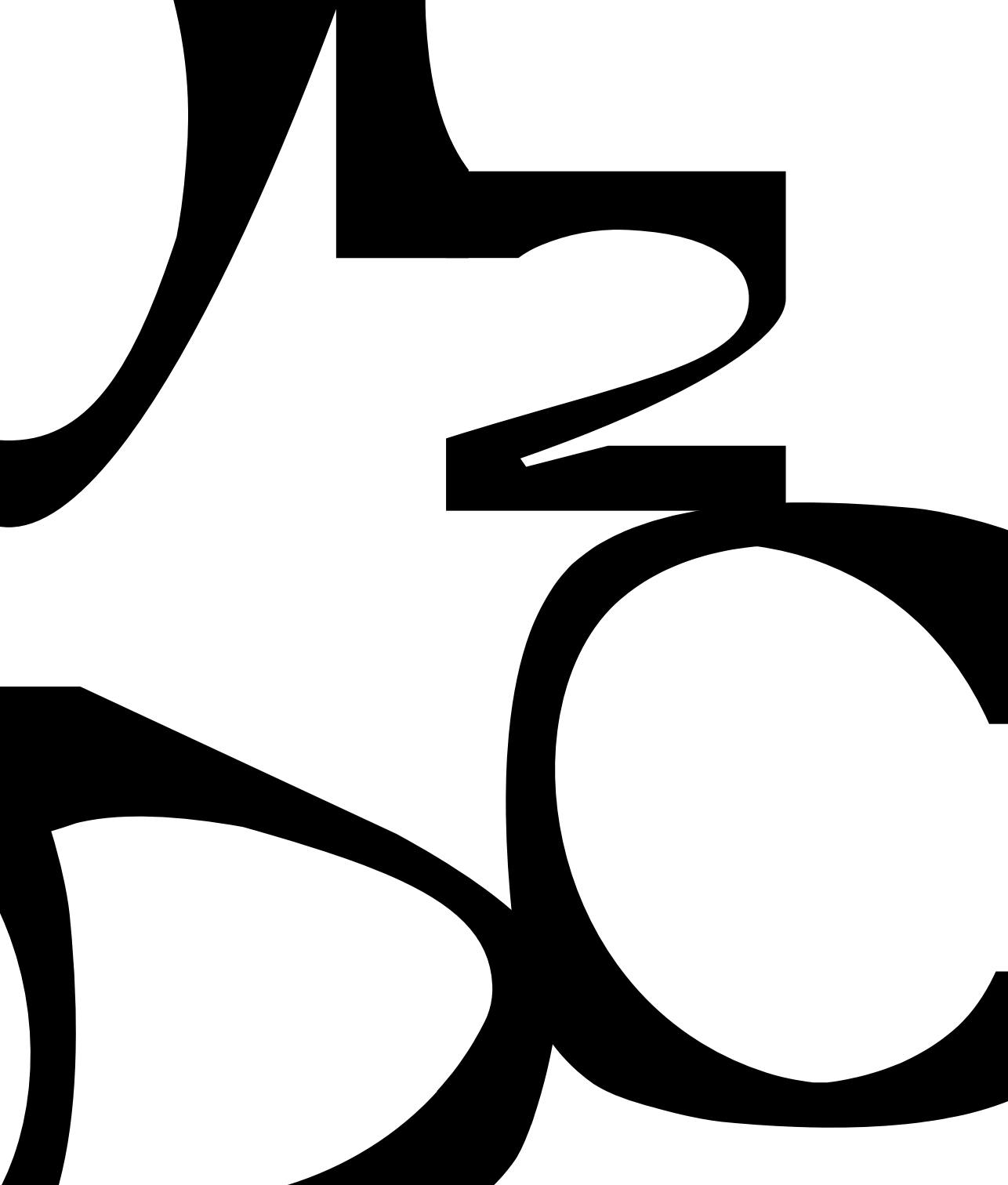
pss

hugh strange

our house: walter segal and the emancipatory building site





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production studies series

This booklet is part of the *Production Studies Series* - a set of 12 publications, each introducing a case central to the formation of this new field of studies and exemplifying its concerns. The series has been created as part of the research project *Translating Ferro/Transforming Knowledge in architecture, design and labour for a new field of Production Studies* (TF/TK). Funded by the Arts and Humanities Research Council and the Fundação de Amparo à Pesquisa do Estado de São Paulo, the project was led by Professors Katie Lloyd Thomas and João Marcos de Almeida Lopes. From 2020 to 2024 TF/TK has brought together dozens of researchers, practitioners and activists from across various countries and institutions.

Sérgio Ferro's writings provided the common theoretical and critical ground for discussions within the project. His work, first presented to an English-speaking audience in 2014 during the 11th Architectural Humanities Research Association conference[1] at Newcastle University, has since gained international recognition, the singularity and analytic power of his work resonating beyond its native sphere of circulation in Brazil and France. A key achievement of TF/TK is precisely the translation and publication in English of a substantial part of his writings.[2] Each of these critical editions, overseen by Silke Kapp and Mariana Moura, have been meticulously carried out, through successive bilingual sessions, open to all affiliated researchers within the project and to guest collaborators, aimed at a collective reading of the translated pieces, text by text, chapter by chapter. From the beginning of the project, Ferro's writings have been a cornerstone of the research network, vital to the maturation of the field, stimulating debates and collaborations.

It was in this environment of intercultural and interdisciplinary exchanges that each of the volumes in this collection was produced, from its editorial conception to its circulation. Together with an edited collection, *Building Sites: Architecture, labour and the field of production studies*,[3] which features chapters by the research team, with many crossovers of concerns with the *Production Studies Series*, they form part of a broader effort to define and structure a field of studies that we have been calling 'Production Studies'. Production Studies (PS) undoubtedly refers to already established interests, although often dispersed across studies of architecture, construction,

self-building, cultures of construction, and participatory design. The PS field is proposed here as an axis which is both methodological and empirical, capable of bringing together objects apparently as diverse as cooperative, participatory and collaborative practices of design and work; processes that connect and separate design and the building site; agents and relationships directly involved in the formal and informal production of space; public policies for habitat design and production, in the countryside and in cities; pedagogical and disciplinary experiences that privilege forms and relations of production in the built environment; technical experiments or formal dilemmas capable of interrelate to 'situations in conflict' relating to production, from traditional practices and forms of knowledge, to actors external to academic, scientific or technological institutions.

Production Studies (PS) provides an empirical axis revealed in the study of specific cases located in time and space, which illuminate methodological, theoretical and political concerns. Inspired by the work of Karl Marx, William Morris, Sérgio Ferro, ProBE (the centre for research into the Production of the Built Environment), Peggy Deamer and the Architecture Lobby, amongst many others, the aim of the *Production Studies Series* is to promote the study of architecture/construction at the clash of various dichotomies: labour and capital; production and consumption; knowledge and power; technology and domination; autonomy and heteronomy. It seeks to overcome the design 'of' production through a shift to design 'for' more equitable and joyful forms of production. PS proposes a methodological approach that examines conflicts within architectural works: in their built materiality - visible or indexical; within work processes and relationships; within construction sites; and understands design creations, or ideas and solutions for construction as material productions. It views them in their mediations with political economy, labour history, the social history of culture, the anthropology of technique, the sociology of labour and not least with the know-how of construction workers. This intellectual endeavour is inherently a political ambition, in an understanding of theory, technique, art as types of practice, as part of the praxis of production and, therefore, as a form of action in reality. As weapons of class struggle, these forms of practice either work for its reproduction or for its transformation and overcoming; we recognise that while all too often production functions as a weapon of domination, it can also be a means of emancipation.

The booklets published in this series stand independently, each with its own institutional, theoretical and empirical backgrounds, expressing authors' prior research and experience. But it was amidst the constancy and intensity

of face-to-face and remote meetings within the TF/TK network; in the influx of and contentions between different methods, interpretations and references; in the sharing of various practical experiences, that the relevance of each of them might be appreciated in the context of the Production Studies we set out here.

The cases in this collection each focus on the 'production' aspect of the built environment, aiming to expand our traditional methods of studying and understanding architecture and construction, thus emphasizing the material, practical, economic, social and even bodily dimensions of work involved. They are not interested in supposedly original or paradigmatic architectural forms. Nor are they distinguished by a peculiar attraction to the nature, advancement or particularity of construction techniques. Neither do they assume the existence of a pure, universal rationality of construction sites. Their purpose is instead to illuminate their contradictions and conflicts, to review productive and political experiments capable of facing the deterioration of working conditions in contemporary construction sites across the planet. Ultimately, it is about observing, from an architectural point of view, in its broadest sense, the effects of the social division of labour - including divisions of gender, race, nationality and class - in the production of the built environment and natural resources.

josé lira
katie lloyd thomas
will thomson

notes

1 Katie Lloyd Thomas, Tilo Amhof and Nick Beech (eds), *Industries of Architecture*. London: Routledge, 2016.

2 Sérgio Ferro, *Architecture from Below*; *Design and the Building Site*; *Construction of Classical Design*. Translated by Ellen Heyward and Ana Naomi de Sousa; edited by Silke Kapp and Marianna Moura. London: MACK, 2024.

3 Matt Davies, Will Thomson, João Marcos de Almeida Lopes, Katie Lloyd Thomas (eds). *Building Sites: Architecture, labour and the field of production studies* London: Routledge, forthcoming.

novem construction diary

> I built 30 houses in London before 1962 but it was becoming really warfare… I found it harder and harder and I longed to get out.[1]

In 1962 the architect Walter Segal was faced with a dual dilemma. Having been born in Germany, and grown up in Switzerland, since the 1930's Segal had lived and practised in Britain but felt he had been engaged in what he described as his '30-year war' with the traditional processes of getting buildings built.[2] This war involved clashes with the state-sponsored bureaucracies of planning and building control that Segal considered set unnecessarily constrictive rules on design, it involved struggles with the established system of contracting, that he felt separated the architect from direct contact with those who constructed his designs, and it involved frustrations with traditional masonry construction that relied on numerous trades and was inherently slow. But Segal also faced an immediate problem. He was building a new home for his family in Highgate, in North London, and this required the demolition of the existing house on the site; he needed to provide accommodation for his family during the building works. Segal did this by constructing a temporary structure to the rear of the plot, later known as, 'the little house in the garden'.

While the main house was to be built in brick, as was much of the architecture of his previous '30-year war', this interim dwelling was of timber construction, notably using a simple structural frame, dimensioned to accommodate off-the-shelf standardised products. Segal established with this house a particular approach to building that he was eventually able to apply in a series of self-build houses on council owned land within the London Borough of Lewisham for which he is best known; the radical simplicity of his approach allowing unskilled residents to construct their own houses with their own hands.

In doing so, he proposed new roles and relationships between architects, builders, and clients. Challenging the separation of design and construction, Segal proposed an approach to design wholly aligned with construction and, perhaps most significantly, re-oriented towards the building site.

But this achievement was only possible through the series of private house commissions completed in the decade between his own temporary house and the Lewisham projects, where these principles were developed and refined, always with a view towards a rigorous simplification of building process that made construction accessible to all.[3] Eventually, the client for one of these projects, the Hollands, suggested that they could construct their house themselves, and the potential of Segal's approach became evident.

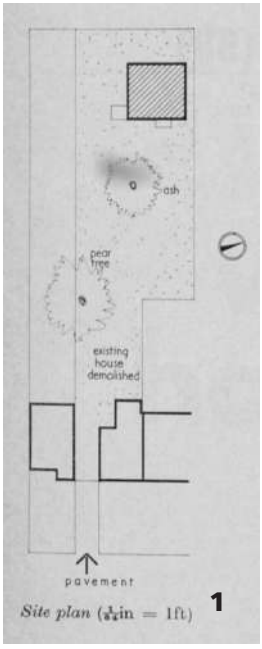
the little house in the garden

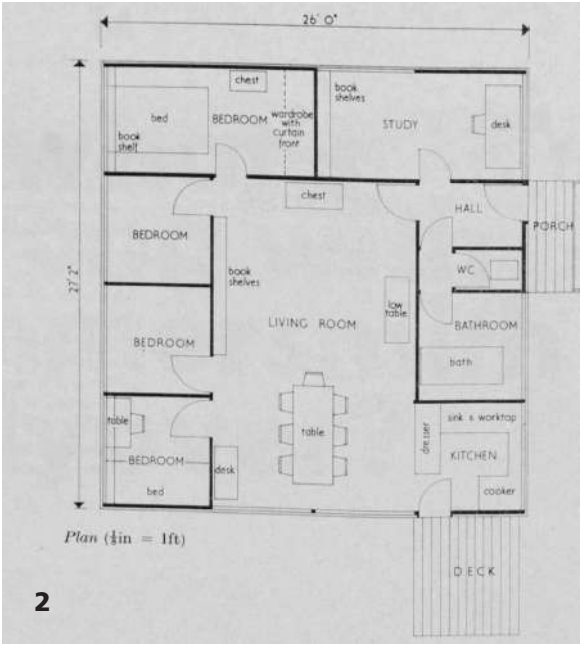
> I slithered into the discovery, shamefully late, that a market of mass-produced materials does exist, that, by and large, there are many materials that are dimensionally co-ordinated which you only have to buy and assemble.[4]

Although conceived as a secondary structure to facilitate the new brick house, the timber building within the garden in Highgate proved pivotal in Walter Segal's career. The ideas tested within this project certainly developed out of previous work, yet they also formed a distinct new trajectory in his oeuvre. A temporary planning permission had been given for the structure, and the funds for it were to come from the budget of the main house. Segal therefore sought to design as cheap a building as possible, one that was both quick to construct and demountable. Significantly, by preserving building elements in their original condition he hoped to recoup as much of the material costs as possible through re-sale of the disassembled parts once the building had served its purpose.

While the proposed brick building was to be set towards the street, the temporary house was located at the far end of the sloping rear garden and, for just under two years, provided accommodation for Segal, his wife, and their children[5] (Fig.1). The house was almost square in plan and very compact, measuring just 715ft^2 and with an internal height of only 7 foot. Distributed around the three sides of a central living room, such that minimal space was required for circulation, the master bedroom, three children's bedrooms, a study, hall, W.C., bathroom, and kitchen, were all extremely small, with built-in storage units reducing the need for additional furniture. The tightness of the rooms was compensated in part by the generosity of the central space onto which they all opened (Fig. 2).

Arranged on a single floor, the house was raised above the surrounding ground on twenty supporting posts, cut to accommodate the varying slope of the back garden (Fig. 3). Remarkably, each post sat unfixed on a 2' square concrete paving slab, which was simply laid into the ground on sand, with no foundations below; Segal's careful calculations had proven that the building weighed enough to remain static, without any fixing to its site, but not enough to require any more than the most minimal of footings. The house was built with a lightweight timber frame, with slender 4"x2" posts supporting 6"x2" rafters and joists. With the joists sitting on top of the beams, and the roof structure lapping to the sides of the posts, the relationship of members within the structural system was very legible. There was minimal cross-bracing, and though some rigidity was provided at the connections, the structure reportedly had a fair bit of give.





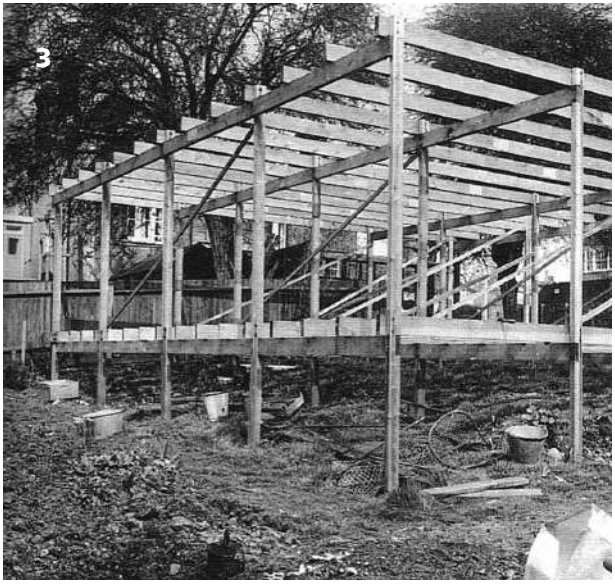


Fig. 1: Site Plan
Fig. 2: Ground Floor Plan. Highgate temporary house.

Fig. 3: Highgate temporary house.

Set within the frame, the external and internal walls, together with the roof, were all formed in woodwool slabs of 2′ widths and 2″ thicknesses, and arranged in three lengths: 6′, 6′8″ and 7′. In total 130 slabs were used in the house. These slabs were readily available from a number of suppliers at the time, with the ones used in the temporary house sourced from British Gypsum. They were factory-made using a mixture of cement and wood strands, and provided both strength and insulating properties, yet were light enough to be easily handled on site. On the roof, the woodwool was laid perpendicular to the rafters, in a grid of 4 x 13 slabs. An underlay of Sisalkraft building paper was loose-laid onto the slabs, with two layers of a bitumen-based roofing felt bonded to this. Unfixed to the substrate, these layers were simply weighed down by a constant one and a half inches of water that covered the roof, together with a series of loose laid bricks. During the hot summer months, to counter evaporation, Segal would top up the water with a hose when needed.

In general, the internal and external wall slabs ran vertically, a single woodwool slab equalling the building's height. Windows were made with unframed single glazing sliding within tracks formed by aluminium angles, and when these occurred the slabs were laid horizontally beneath, with the heights of the apertures determined by the width of the slab. A slurry was applied to the external wall slabs, which were then clad on the outside with green mineral roofing felt. The inner face of these external walls was lined in hardboard, with the rough side of the boards facing into the room.

Also, of 2″ thick woodwool slabs, the internal walls were loosely lined with a wood chip paper that remained undecorated and both these and the external panels were clamped in place with battens. These visible fixing battens to internal and external walls were to be a key and highly recognisable element of Segal's timber architecture of the following twenty-five years, exemplifying the logic of his approach. The timber battens clamped the woodwool slabs, together with any linings, and were bolted tight; the fixity of the junction relying on pressure rather than nailing or screwing. While Segal recognised that nails would have been cheaper, this bolted detail, which resulted in no holes to the planar materials, was preferred as it allowed for the demounting and resale of materials.

Segal managed the construction works on site without a general contractor, co-ordinating work directly with the trades involved. Key amongst these was the timber work, and here Segal employed Fred Wade for both carpentry and joinery. Wade became a near constant in the domestic projects that followed, the understanding that developed between the two men clearly a factor in the process of gradual technical refinement through these houses. In addition to Wade, a drainlayer, roofer, electrician, plumber, and glazier were all employed directly by Segal at Highgate.

Access to the site was less than ideal, with materials having to be carried by hand through the basement of the existing main house and down the garden. This awkwardness revealed another benefit of the lightness of the timber frame, with the use of heavy masonry materials very limited, and the small house was quickly constructed in just ten weeks.

The construction cost was remarkably low, including materials and labour, totalling just £854. As an indication of relative price, this was about 1/10 the cost per square foot of the brick build that followed. This was of course a primary aim of the building; to retain as much as possible of the overall budget for the construction of the main house. And it was achievable because Segal had a very keen sense of where the costs resided in a project, and from this, how an economy of means might best be considered and deployed.

His first strategy to this effect was by not employing a main contractor. This omitted the costs of administration and contractor profit from the project budget, but it also meant there was no intermediary between architect and labour, which suited Segal's aspiration for a closer, more direct involvement in construction. In relation to material costs, the savings were twofold. A number of low-cost materials were utilised in place of standard solutions, with atypical internal finishes particularly notable; the use of wood chip paper in lieu of wallpaper as an internal wall finish is a significant example of this. But the material costs were also reduced through a reduction in the quantities used: the slenderness of the frame required less timber than might otherwise be expected, but also created a building that was so light that traditional foundations could be dispensed with. Perhaps most significant in reducing costs, the simplicity of the construction greatly reduced the work involved on site, with the construction of the temporary house requiring in Segal's calculations a combined labour input of just 13 working weeks.

Segal's reductive approach to construction was neither didactic, nor aesthetically oriented. It entailed a reduction in the number of trades involved, a reduction in the number of operations involved by each trade, and finally, a reduction in the complexity of operation by each trade. Critically, Segal recognised that a historical shift had occurred in the balance between material and labour costs. Using cheaper, and less material helped, but the most significant savings were achieved through re-thinking the operation of labour within the building process.

The Highgate temporary house shared a number of ideas with earlier projects. Segal had throughout his career been preoccupied with the subject of dwelling, carefully surveying, photographing, and studying house forms from Ibiza, Mallorca, and Egypt first hand, and, in his extensive study of 1948,

Home & Environment[6], had produced a detailed analysis of low-rise housing typologies. Although his buildings prior to the temporary Highgate house were almost entirely masonry, there were notable exceptions. As an architectural student in Switzerland he had studied under Hans Poelzig, and had been greatly influenced by the publication in 1930 of a small book on timber construction, *Holzhausbau*, by Konrad Wachsmann. Soon after finishing his studies, in 1932, he designed a summer house with a timber frame structure, *La Casa Piccola*, and in 1957, also in Switzerland, he built himself a timber ski house. Parallels between these projects and the later houses make clear his ready knowledge of timber construction. There were also precedents for his later understanding of standardisation. In the 1950s he designed a factory and warehouse in Hackney, London, for Premier Pickle, that was constructed in brick and concrete; the plan layout incorporated an administration block to the front, behind which open factory spaces allowed for the pickling and bottling. In a precursor to the later timber houses, the whole site plan was set out on a grid determined by the dimensions of standard woodwool slabs.

Segal had also experimented with alternative contractual arrangements, notably in the small terrace of houses at Tasker Road in North London. This project, which was built around the same time as the temporary house as a speculative development, involved Segal acting as main contractor, and his wife, Moran Scott, as client. However, in the Highgate temporary house, these earlier ideas joined those of low-cost and demount-ability in a wholly coherent manner, establishing a set of principles that were developed and refined in the subsequent private commissions. From this point on, process fully aligned with product; the 'how' of building seemingly equally important to Segal as the 'what'.

the private houses

Although completed in 1963, the temporary house in Highgate was not published until three years later when the project was extensively featured by the *Architect's Journal*, where Segal was a regular contributor, and was much admired by the magazine's editor, Colin Boyne (Fig. 4). In the same year several articles within the mainstream press brought the house to a wider public, all focussing on the project's remarkably low cost. The coverage quickly led to a demand for comparable homes from private clients, and over the next few years, and in particular from 1968-71, Segal completed a number of private houses in timber frame construction, all for extremely low budgets and completed within very short programmes.

First of these was the Donohue House, of 1968, located in Ballygarrett, Ireland (Fig.5). The project had much in common with Segal's own house: it was

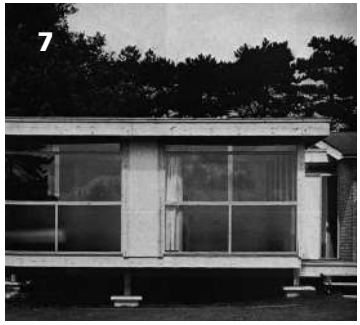
Fig. 4: Highgate temporary house.

Fig. 5: Donohue House, Ballygarrett, 1968.

Fig. 6: The Tree House, Halstead, 1969.

Fig. 7: Vesey Holt Extension, 'Phantom Ranch', 1970.

Fig. 8: The Wembley Playroom, 1970.



single-storey and was very tightly planned. At just 630ft^2, yet accommodating three bedrooms, it was also very small. Costing only a little more than the temporary Highgate house, the project was constructed in a three-week period over the summer holidays by the owner working alongside a carpenter. The basis of the construction was very similar: a lightweight timber frame, raised above the ground, with the frame infilled with uncut woodwool slabs, and the external walls clad in the same green felt. However, several other details and finishes differed, notably the addition of plasterboard to the internal walls in lieu of hardboard and building paper, although, in the same spirit, the plasterboard was left unpainted. And, while the horizontal roof plane was unbroken in the Highgate project, here, clerestorey glazing was introduced above, to light the centrally located bathroom.

The following year, a house at Halstead in Essex was built for the Colliers, named The Tree House by the client as the sloping site lay close to an orchard (Fig. 6). Once again, the Highgate template of a single storey lightweight timber frame with wood wool slab infill was utilised, but again with further variations. Like the house at Ballygarrett, internal walls and ceilings were finished in unpainted plasterboard, but by this stage alternatives to water were found to hold the loose laid roofing down, and, to satisfy building regulations, concrete foundations were cast below the paving slabs on which the frame sat. Differing from both the Highgate and Donohue houses, green felt used for the external wall cladding was replaced with enamelled asbestos sheets, in white and red. Planned and built with three bedrooms in a simple rectangular plan form, at 1025ft^2 the house was larger than the previous two buildings. Immediately following completion of building works, the client added a wing of 345ft^2, containing an additional bedroom and study, and configured in a stepped arrangement that now wrapped around an existing tree, and allowed access to the roof. The ease with which the original house design was reconfigured and expanded demonstrated to Segal both the flexibility and extendibility of his approach.

Several projects were completed in 1970, each suggesting slight technical adjustment and incremental development. In North Chailey, East Sussex, a substantial extension was added to an existing single storey house, Phantom Ranch for the Vesey Holts (Fig. 7). The addition was almost self-contained, providing bedrooms, bathroom, study and living space, although no kitchen, and was built in 19 weeks, with the husband and wife occasionally helping with construction. Like the project at Halstead, it was externally clad in the enamel asbestos panels that became a standard component of the projects that followed. But a significant new development was here added to the architectural vocabulary, with the flat roof projecting beyond the walls, where previously it was flush,

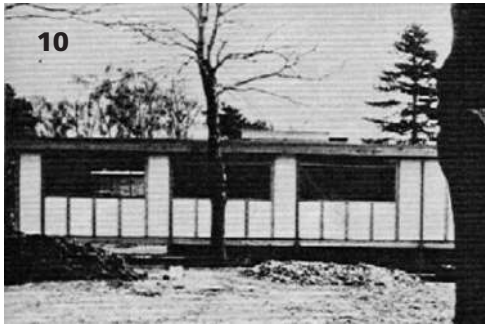


Fig. 9: Leigh House, Yelling, 1970.

Fig. 10: Cook House, Warrenorth, 1971

Fig. 11: Lomask House, Co.Cork, Ireland, 1971

now providing both shading to the large areas of glazing, and some protection from rain to the opening windows.

Also completed in 1970, the Wembley Playroom in North-West London, at just 324ft^2, was the smallest of the Segal timber projects to date, a single space within a free-standing building supported on four posts (Fig. 8). Constructed by Fred Wade in just 3 weeks, the building utilised the Glasal asbestos panels both externally, in white, and, for the first time, as an internal finish, in red.

To this point, the building layouts were notable for their tight spatial planning, with the economic ratio of external wall to internal floor space very much in evidence, but with the Leigh House in Yelling, Cambridgeshire, completed in 1970, Segal started working with looser plan configurations (Fig. 9). The house shared the construction methodology and appearance of the previous buildings but differed significantly in layout. Acoustic transmission was an issue in the earlier houses, a consequence of the detailed design of the internal partitions that was exacerbated by the compactness of the house plans. At Yelling, to provide acoustic separation, the house was planned as two separate wings for bedrooms and living spaces. These wings were separated by an open, sheltered terrace, with a connecting hall and adjacent bathrooms providing access and an additional buffer to sound transmission. At 1204ft^2 it was the largest house to date, and the loose layout, combined with the relative generosity in size, suggested a new level of spatial complexity.

A similar approach of providing acoustic separation through an extended plan layout was developed the following year at the Cook House, in North Common, East Sussex (Fig.10). The client here had seven children and wanted a larger house of around 1700ft^2. While the main living accommodation was compactly planned, noise reduction was achieved by laying the four bedrooms in a wing that extended away from the living spaces, resulting in a generous 76ft long building. In earlier projects the finish of the interiors resulted directly from the exposed construction, and had very much been to Segal's designs, but here the clients intervened, and the children chose various wallpapers to their bedrooms that were then fitted between battens.

While the Leigh and Cook houses experimented with how Segal's method of construction might produce more complex plan arrangements, the Lomask House, in Ballycummisk, Ireland, constructed in 1971, explored sectional variation (Fig.11). Located on a sloping site overlooking the nearby bay, the project was still fundamentally single storey, but here, stepped levels differentiated three internal areas. Two level changes, at six steps each, allowed views from the master bedroom, at the top of the site, over the living space at the bottom, with the middle section slipped in plan to form a private terrace at the centre of the house.

Looking at this series of private commissions dating from 1968 to1971 in relation to the Highgate house, Segal can be seen to have established the key construction principles in his own project, while the specific details were developed and further refined in the subsequent houses.[7] To some extent this process of refinement related to transferring ideas from a temporary structure to permanent structures, and recognising the necessary changes that came from this shift, in both client expectation and regulatory context. The addition of small concrete footings as foundations, necessary to satisfy building regulations for a permanent building, is a key example of this. Some changes in detailing represented incremental improvements: lessons learned through each project, such as the change in wall cladding from green felt to enamel finished asbestos, the introduction of pebbles to the roofs in lieu of water and bricks, and the overhanging roof, rather than flush edge profile. But the projects also reveal Segal exploring the spatial opportunities nascent within the logic of his own house, such as his experiments with looser plan configurations and more complex sections.

the rigorous simplification of building process

Despite all the refinements and developments, a certain strategic logic of building was nevertheless established in the Highgate Temporary House that guided all the subsequent projects. The rationale of the temporary house was centred on the use of readily available, mass-produced, and dimensionally co-ordinated materials. These off-the-shelf elements were employed with minimal on-site alteration and fitted with dry jointing into a timber post and beam structure that was dimensioned according to standard woodwool slabs and plywood sheets. With the omission of wet trades, and the reduction in secondary alteration, the nature of on-site work was transformed towards a process of assembly. Key to the constructional logic of these buildings was the use of off-the-shelf materials that, although obtained from different sources, could be easily combined. In part Segal was benefitting from a level of dimensional coordination that already existed in industry, but he was also acting with precision in selecting specific materials for their dimensional compatibility.

Here, Segal was not designing a system, or attempting to invent or standardise a production process. Nor was he was designing components or joints to be manufactured. Indeed, Segal's approach suggested a critique of closed systems of prefabrication and standardisation. The idea of a fully considered integration of industrialisation within the construction process held a strong

appeal to architects of the Modern Movement, such as Walter Gropius and Konrad Wachsmann.[8] With an emphasis on the connection of components, jointing became key to these architects, and the design of joints often fetishized. Adherents divided into those promoting a closed system, one fully integrated yet unable to connect with other systems, and those, like Segal, who pursued an open system able to accommodate components and materials from a variety of sources. The former type was also popular with the rival construction companies that dominated post-war building in Britain, each firm keen to exclude their competitors through the technical exclusivity of their system.[9] Segal, amongst others, recognised the limits of standardisation within closed systems, and his timber details allowed greater freedoms of choice.

His strategy involved observing the coordination that already existed in industrial production and seeking to best utilise and combine these ready-made building products within an accommodating framework.[10] These materials were fitted into the timber post and beam structure with minimal on-site alteration, little change to their finish or appearance, and only using dry jointing. With limited modification, the structural frame was able to be dimensioned according to standard available materials, with the sizing of the wood wool slabs of particular significance (Fig.12). The panel-to-panel wall detail makes clear the overall constructional logic of Segal's method: the wood wool came in 2' by 2" slabs, so the internal and external walls are sized accordingly, and the panels are spaced 2" apart to allow cross walls. After linings are applied to either side, also minimally altered, timber battens are bolted tight, so the wall is held together without glue or screws, relying instead on pressure and friction. The detail thus suggests a dimensional arrangement, an elimination of unnecessary alterations, and a manner of connection that is both flexible and adaptable. And the detail also leads to a basic tartan grid, with 2' and 2" spacing, later 600mm and 50mm, on which all the house plans were based[11] (Fig. 13). This grid and constructional logic, in turn, lead to house plans where the walls are drawn as a series of 2' 2" slabs, and other elements, such as windows, doors or stairs are similarly co-ordinated. The logic continues through all the details; for instance, the doors largely fit into the grid, as 2' single or 4' double units, though the framing reduced these further, with 1'9" wide door blanks (535mm) used generally (Fig. 14). And, pursuing the logic of dry-fit, the roofing felt edge is clamped tight at the perimeter, but the membrane itself is neither bonded to the substrate or screw-fixed or bonded at the edges, allowing free thermal movement.

In parallel with the simplification of construction processes, Segal's own working method undertook a process of simplification. In these private commissions, he again managed the projects without a main contractor, working closely

Fig. 12: Wood wool building slabs advertisement, 1970.

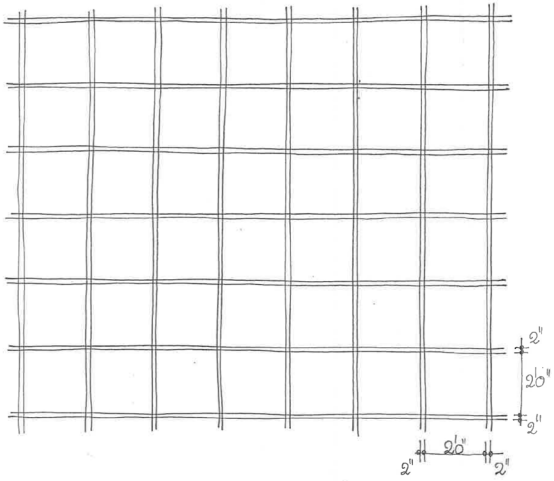
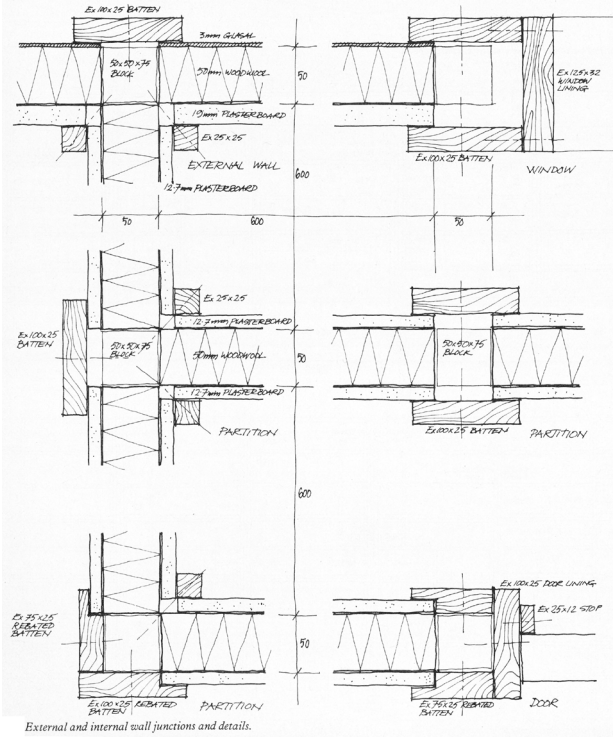


Fig. 13: Segal's tartan grid (Drawing by Jon Broome).



External and internal wall junctions and details.

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Fig. 14: Typical wall detail. (Drawing by Jon Broome).

Fig. 15: Sequence of Erection and Assembly.

with a carpenter, often Wade, who did most of the works, and with electricians, plumbers and roofers contributing when needed. Apart from periods at the beginning and end of his career, he worked without architectural assistants. Reinforcing his independence, he also worked without structural engineers or quantity surveyors, doing all his own structural calculations and schedules of materials.

By this time Segal had simplified the drawn and written information from which the architecture was constructed. Each house had a set of project-specific information. A4 freehand drawings showing the general arrangement of plan, section and elevation were produced for developing the layout with the client, and for the planning submission, while structural layouts, together with calculations, were produced for Building Regulations sign-off. A project-specific schedule of materials, with inset drawings clarifying information where necessary, set out everything required for the job, and was organised in the order of the sequence of purchasing. But Segal had also developed a generic set of

SEQUANCE OF ERECTION AND ASSEMBLY.

Foundations

Construct piers of dimensions as shown on the drawings and of a minimum depth of 3ft in 1:2:4 concrete and bed on top, before the concrete is fully cured, best quality concrete paving slabs 2ft by 2ft by 2in thickness well levelled and projecting 2in above the level of the site using a 1:1:2 concrete bed.

Perimeter paving

Bed in clean sand 2ft by 2ft by 2in best quality paving slabs as before to enclose perimeter of building as shown on the drawing. Start with bedding the slabs in front of the slabs of the foundation piers and fill in the spaces between them with evenly spaced slabs likewise bedded.

Strip off topsoil.

Upon completion of the perimeter paving strip off the existing top soil and dispose where directed all to a depth of 4in. Fill back with loosely laid well distributed clean gravel ($\frac{3}{4}$ in minimum) without any admixture of sand up to the level of the underside of the paving slabs. HW OVERLITE SLABS

Framing

Carefully mark on the paving slabs of the posts all centres as shown and check their accuracy of position. Note in particular the relationship of posts and infilling walls and consult for this purpose also the catalogue of elements (no.II). Place under each post a 2in by 6in sheet of 5-5lb lead.

All posts and beams to be pre-drilled before erection; wherever possible drill holes to be staggered. Bolts to be galvanised or sherardised $\frac{3}{8}$in min.dia; for longer spans $\frac{1}{2}$in dia. bolts to be used. Stand up and plumb frames using temporary bracing; likewise pin some floor joists prior to final fixing to the beams (CE nos.IV,V). Follow carefully the building plans and note which beams do not project to the front faces of the posts.

Fix the roof beams to the posts as shown (CE nos IV,V) observing carefully which beams are to be bolted to the posts and which are to be checked out to provide seating on top of the posts; this applies chiefly to the end frames and where roof beams project to provide overhangs. Note carefully all instances where secondary posts are to be used which are to be attached at floor level either to beams or joists by bolting and which serve to reduce spans of roofing beams or as supports for these; the latter case occurs with cantilever constructions. Consult the building plans for this purpose; particularly projecting parts of the building where such cantilever structures are employed. Fix to the roofing beams joist battens (CE no V) which are to receive the roofing joists which must be checked out as shown (CE no.V) and fix some of these joists temporarily by pinning to stiffen the structure prior to final plumbing.

Select all members of the frame from the timber store on site in strict accordance with the list of materials with particular attention to columns 2-5. (All lengths are listed in the lengths in which they will be required cut to the nearest ft and failure to observe the description col.2 will result in loss of structural members for the framework).

details applicable to all the projects of this period. This comprised a twenty page 'Catalogue of Elements', that presented standard details common to all projects, although as we have seen, this was in a continual state of development and improvement. An accompanying nine-page written document, 'Sequence of Erection & Assembly', described the process of construction step-by-step in as clear and simple a manner as possible (Fig. 15). The specific and generic information combined to describe not only the configuration of the completed building, as is usual in architectural drawings, but also how one should go about its construction.

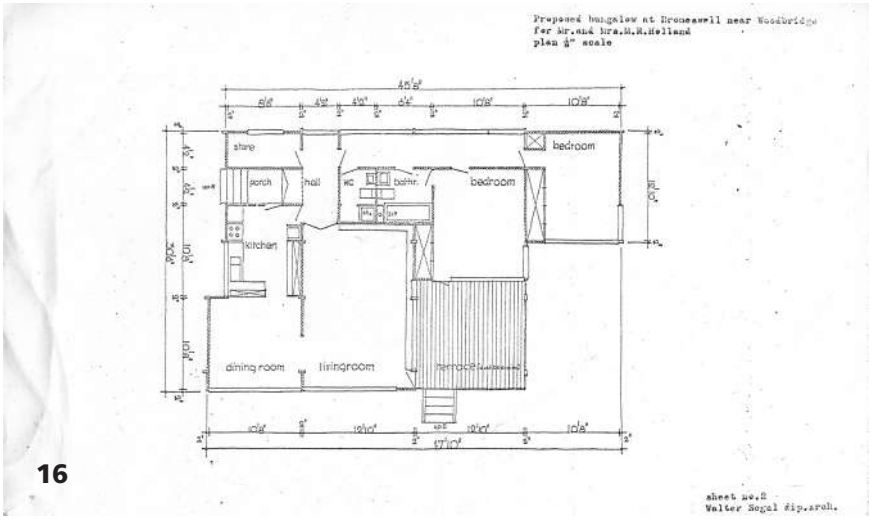
novem

> We started in our summer holidays. And then we moved in at the beginning of December, so it was pretty good going. Just weekends and evenings as well because we were working during the week. We used to finish work and go back to the site. We worked every hour under the sun, really.
>
> **Muriel Holland**[12]

> We gained in the rapid construction. We gained a house of our own choosing, or our own design in many respects – and this at a price we could afford. We lost a lot of sleep. It was often very tiring.
>
> **Michael Holland**[13]

Eventually, and perhaps inevitably, one of Segal's clients told him that they wanted to take on their project's construction themselves. The clients were a pair of young teachers in their twenties, Muriel and Michael Holland, who had seen a Segal house published in the mainstream press. Observing the remarkable simplicity of the building process evident in the earlier houses, they were confident they could construct themselves, significantly saving on their costs. The house that they went on to build in the small village of Bromeswell, Suffolk, was both typical of the Segal-designed houses of this period and a culmination of the process of design refinement to this date. Being the ninth timber frame building that Segal had completed since his own Highgate temporary house, the Hollands named the house in Latin, Novem.

Together with friends, Ricky and Erna Asker, they bought, and divided a plot that had been granted outline planning permission in 1969 for two single storey houses. The layout set the building back from the road, at the upper level of its sloping site, giving far views over the surrounding East Anglian countryside. A garage was constructed at the lower level, with an adjacent external stair leading up to the house's front door. Seeking to minimise circulation, the



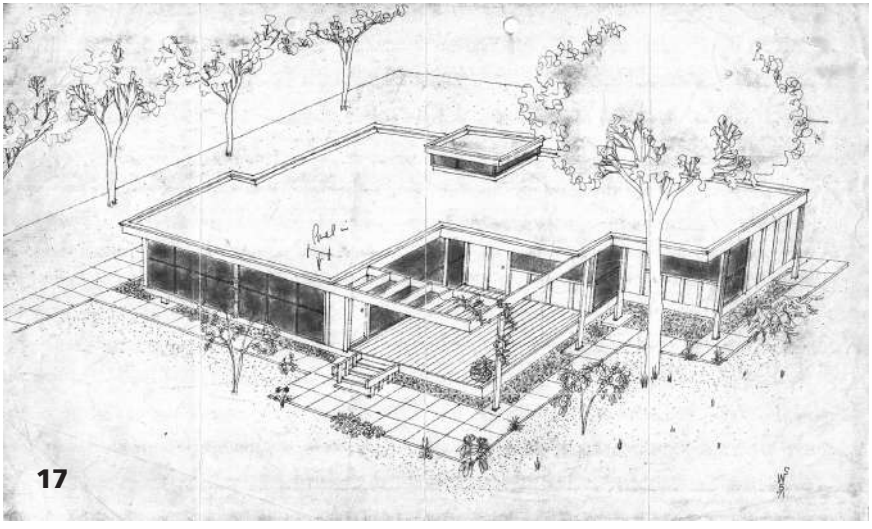


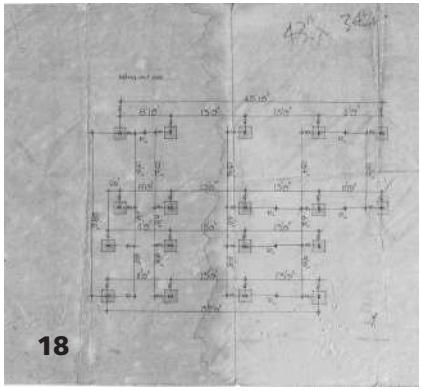
Fig. 16: Ground Floor Plan, Novem, 1971.

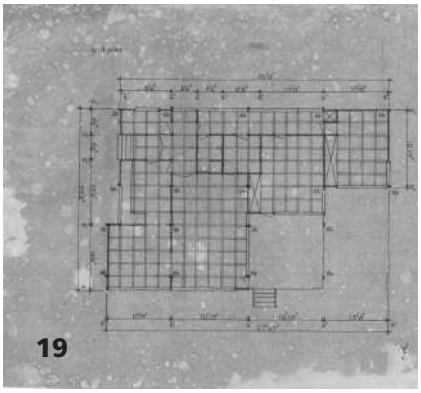
Fig. 17: Perspective, Novem, 1971.

main living accommodation was compactly planned by Segal, with the hall, kitchen, dining room and living room all directly connected in a looped arrangement. To one side, two bedrooms formed a staggered L-shape, acoustically separated by the bathroom block, and with the master bedroom and living space both opening onto a South-West facing external terrace. (Figs. 16, 17) As with his previous clients, Segal involved the Hollands closely in the design process and encouraged their decision-making, including the layout, cladding colours and ironmongery.

The Hollands had bought the site in early 1971, and Segal worked during March and April of that year on the design, sending twelve different plan arrangements for their consideration, all within the same tartan grid. As well as involvement in the design, however, the Hollands were also keen to be involved in the construction work. Michael, 26 years old, had already renovated a house in nearby Woodbridge, learning various building skills as he went, and now, he and Muriel, just 22 years old, took on the job of constructing their own house from scratch. They employed various trades during the works: a bricklayer who built the septic tank at the bottom of the garden, two carpenters who, with Michael's assistance, constructed the frame in two days, the roofers who laid the membrane and the pebbles that held it down, and a jobbing carpenter, Maxi, who undertook miscellaneous works to speed progress. They also had help from friends and colleagues as they progressed. Nevertheless, the Hollands undertook the vast majority of the construction work on site, in their free time, during the summer holidays, in evenings and weekends, and all the while still teaching in the local school. In this endeavour they were encouraged by Segal, who assured them that once they had worked their way through the drawings, calculations and schedules, they would find, 'it is really very simple.' Indeed, Segal later remarked on their endeavour: 'with their enthusiasm and motivation there was no trouble and no difficulty, and it succeeded quite astonishingly'.[14]

Their house was planned to Segal's standard 2' 2" tartan grid, with 3' deep concrete pad foundations that the Hollands dug and poured together, with the architect insisting on demanding tolerances for the setting out, such that the frame above was absolutely central to each pad (Fig. 18). The posts and beams of the slender timber frame were set on paving slabs capping the foundations, the end grain of the posts protected from moisture by a separating strip of lead, and these slabs continued around the perimeter of the building, providing a dry work surface (Fig. 19). The structural frame extended in part around the boarded terrace, giving a sense of enclosure and reinforcing a reading of this external space as an integral part of the house.





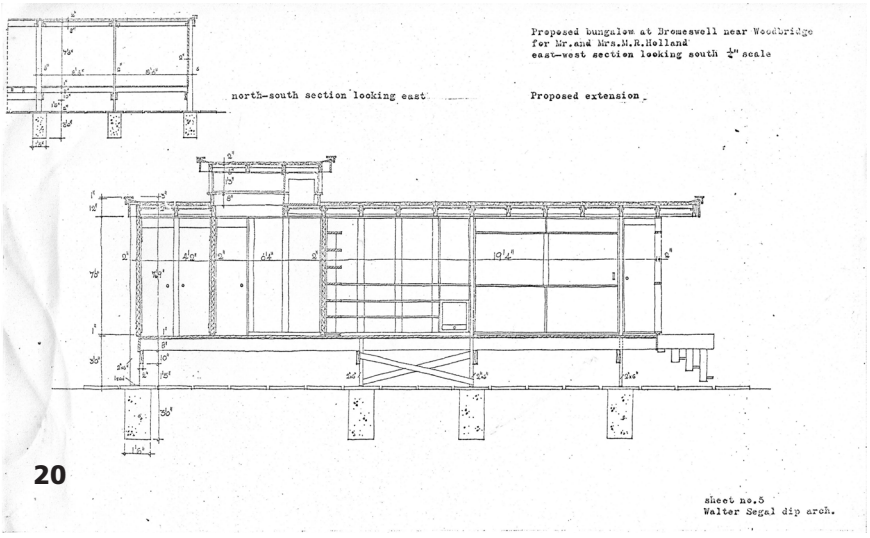


Fig. 18: Foundations Plan, Novem, 1971.

Fig. 19: Floor Plan / Grid layout, Novem, 1971.

Fig. 20: Sections, Novem, 1971.

While the roof profile is generally flush, to the West-facing elevations it projects forward to provide shading. This detail, combined with a small cantilever to the frame, gives a distinctive forward-leaning section to the front façade of the house (Fig. 20).

Working in the dry summer weather, two carpenters recommended by Segal spent two days working with Michael Holland erecting the structural timber frame.[15] This was of pine and remained unpainted, but the battens that rhythmically enclosed the house, securing in place the woodwool slabs and external and internal cladding, were, together with the fascia boards, all painted white by Muriel Holland. Working in parallel with the frame assembly, and later wall construction, she prepared the fascia and battens prior to assembly. Supplied in 4' x 8' sizes by the manufacturer Eternit, standardised, and mass-produced Glasal panels clad the external walls, as well as those of the bathroom. These were chosen in a grey-green colour that, together with the painted battens and unpainted frame, gave a highly articulated, and somewhat abstract reading to the external elevations.

The opening windows were formed as horizontally sliding sashes with ¾" aluminium angles, the elegant and simple solution designed by Segal for his own Highgate house. While good at providing ventilation, they were not effective at keeping draughts out, and were one of the factors that led to this, along with Segal's other timber-framed houses, being particularly cold in the winter months. . Three electric storage heaters provided warmth of a sort, but were used sparingly to save money, Muriel Holland noting that she later discovered her mother-in-law never visited between October and Easter, for fear of the house's cold.[16]

Internally, the painted battens fixed plasterboard panels to the walls and ceilings, while timber floorboards were generally in softwood, but with oak boards used in the living room and hall. Sized to fit within the structural grid, the internal doors were generally the standard 1'9" width (535mm), with battens screwed either side to support them. The W.C. and bathroom backed onto each other and, as they were located centrally within the plan, were naturally lit via clerestory glazing above. The Hollands completed all the sanitaryware installation here, and as external grade Glasal panels, this time in Marine Blue, were used to line the bathroom, no tiling was installed; excluding foundations, the house altogether comprised of dry construction. With the house lifted above the ground, the void below provided space for the frame's cross bracing, as well as ease of access to the plumbing and electricity which ran beneath the flooring. While facilitating ease of construction, this void certainly contributed to the house's internal environment's coldness

but was appreciated by the Hollands as useful storage space. The two spent Christmas 1971 in Novem, having bought the site in the Spring of that year; it had certainly been fast progress. Muriel's parents visited for the festive break, and the Hollands put-up makeshift curtains to provide privacy to the bedroom's sizeable windows.

The following year, with their neighbours house also now completed, the sloped access route to the higher level was no longer required, and the two households built a pair of adjacent garages in its place, to serve the two houses. As their neighbour wished to build a garage of block construction they required a concrete raft foundation, while Segal had designed a timber frame garage for the Hollands, to match the house, with woodwool slabs to walls and roof. There was no sense in the two garages having differing foundations, and so this led to the slightly anachronistic solution of the Hollands constructing here a Segal-designed timber frame garage on a four-inch concrete slab.

House and garage as originally designed were now complete. Novem had been built by the Hollands in 1971 in preparation for starting a family and in 1974, as their family grew (eventually the pair had three children between 1973 and 1977), they added an extension that housed an additional two bedrooms, in what could now be read in plan as a children's wing.

Once more, Segal provided the drawings, calculations, and schedules for construction. This time, the Hollands were able to construct the frame without Segal's carpenters, and only brought in outside help for the roofing membrane, and some assistance again from Maxi. The adaptability of the construction methodology allowed the couple to simply dismount the end wall of the existing house and add the new structure and cladding in place; the extension appearing as if it had always been there. The Hollands continued living at the property until 1978 when Michael was offered a headship at a school in Hampshire, and the family left behind the house they had built with their own hands.

Clients had previously worked alongside skilled trades in Segal's projects, such as at the Donohue House, but here, for the first time, they undertook the larger part of the works, employing trades and labour only when absolutely required. The Highgate house had been designed with low-cost as the primary concern, and to achieve this Segal had simplified. Interestingly, the private houses that followed didn't work towards reducing the expense of construction any further, as this aspect of building had already been resolved to the architect's satisfaction, and all these projects were constructed

at very low cost. Instead, these projects transferred the ideas explored in a temporary structure to suitability in a permanent form. In addition, and without losing the essential qualities of the earlier house, the details were continually refined.

The simplicity of process that these projects revealed allowed Segal's clients to become more involved in both designing and building their own homes. In this respect, the house built by Muriel and Michael Holland can be seen as the end point in this line of design enquiry, the culmination in a search for integration of design and realisation. Bringing the roles of architect, client and builder into a closer relationship thereby suggested a rejection of, and reaction against, the predominant culture that distances project phases and project roles.

Half a century after its construction, while a number of the Segal's other private houses of the era have since been demolished, the house still stands, and is indeed still in the same ownership following the Hollands' sale. But it has been significantly altered over the years, for reasons that must have seemed sensible to the owners at the time, and now bears little resemblance to the original structure.

lewisham self-builds

> We were constantly surprised, doing things we'd never dreamt of before. By now we were pretty much all working on our own houses, but the friendship and mutual support of the group had been invaluable.[17]

As his private clients took on ever greater personal responsibility for the construction work, culminating with the house the Hollands built for themselves, Segal saw the wider potential of his approach for self-build, and was keen to apply this to social housing schemes. During the early 1970s he worked on a number of community self-build schemes, but to his great frustration, these failed to materialise. Eventually however, in 1975, and through their mutual connection with Colin Ward, Segal met the Deputy Borough Architect at Lewisham Council, Brian Richardson. Keen to involve Segal in the Council's housing projects, Richardson introduced him to various councillors including Nicolas Taylor, the Chair of Lewisham Council Planning Committee at the time. Taylor involved Ron Pepper, then chairman of the Housing Committee, and encouraged Richardson to produce a report for this Committee, recommending Segal's approach. The councillors and housing officials were taken to visit one of Segal's completed private houses, where the client, having un-

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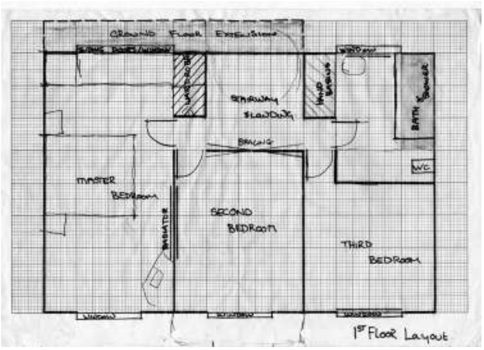

22

LEWISHAM SELF BUILD II
PROVISIONAL PROGRAMME for EVENING CLASSES

WEEK No.	PROGRAMME		MATERIALS
1	INTRODUCTION SITE WORKS	How Walter invented the houses Setting out/Foundations/Concrete slabs	slides
2	FRAMING	Marking out/Measurement/Joints Squaring up/Templates/Drilling.	slides
3	TOOLS	Contents of Tool kit/Practice use of Power Saw/Drill/Jigsaw/Hand tools 110v tools for site use.	tools
4	MAKING JOINTS	Making templates/making bolted joints/making nailplate joints/ making housed joints	timber bolts nailplates slides
5	TAKING LEVELS	Use of level to get levels of Foundations	level
	ERECTING FRAME	Stacking in order/temporary bracing	slides
6	COMPLETING FRAME	Bracing/Battens/Joists/Noggins	slides
7	ROOF FLOOR	Woodwool slabs/Fascia/Capping Underlining/Insulation	slides
8	WALLS	Slabs/plasterboard/External panels/ Blocks/Scaffolding	slides
9	ELECTRICS	Planning the position of fittings/ Circuit layouts	
10	ELECTRICS	Practice at wiring plug/Switch/ Ceiling rose/Consumer unit/ Earthing	fittings wire etc
11	PLUMBING	Planning layouts of Hot& Cold water/Heating/Boiler position/ Waste pipework/Ducts/Tanks/ Rainwater	
12	PLUMBING	Practice making joints in PVC/ Copper	pipe fittings
13	PLUMBING	Drainage/Gullies/Manholes	
14	KITCHEN PLANNING		
15	BATHROOM PLANNING		
16	JOINERY	Windows/Doors/Stairs	door/ ironmongery
17	JOINERY	Practice fitting a lock/ Hanging door	
18	DOCUMENTATION	Bill of Quantities/Drawings	
19	ORGANISATION	Receiving material/Checking/Procedures	

23

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Fig. 21: Walter's Way, Client layout drawing.

Fig. 22: Lewisham Self-Build Evening Classes.

Fig. 23: Walter's Way, Site Works.

Fig. 24: Walter's Way, Raising the frames.

dertaken much of the construction work themselves, enthused about Segal's method. On the basis of the report and visit, the committee voted in March 1976 to proceed with the architect's appointment, as well as with the selection of sites and self-builders.

The initial opportunity for the first phase of projects was advertised in the local council newspaper, *Outlook*, with an invitation for people on the council's waiting list, and these self-builders were selected by random ballot following a public meeting in 1976, at which Segal presented his design approach. The project progressed on the basis that the council was to provide the land, central government the money for materials, and the self-builders the labour. On completion, the houses would be sold within a shared ownership arrangement, where the self-builders owned 50% through a council-backed mortgage, and 50% was to be paid as rent to the council. Four sites were selected within the borough for fourteen houses; all the sites were deemed unsuitable for standard housing solutions. In Bromley a small site was carved from an existing villa's garden. This site allowed two houses, a single-storey, and a two-storey, that was the first of the self-builds to be completed, by Ken Atkins, who went on to provide much advice and support to later Lewisham self-builders. Two sites close together in Sydenham accommodated five houses, including a narrow, steeply sloping infill site with paired, two-storey houses. The largest site was in Forest Hill, in what was later to become Segal Close. Here, seven single-storey houses shared a communal parking area to the front of the site, allowing the houses to be accessed from a pedestrian lane. Despite the rush of shared enthusiasm at the beginning of the project in 1976, it was not until March 1979 that construction of the first phase finally started. Delays in financial administration and building control resulted from an unfamiliarity, on the part of central government and the various council departments involved, with both the form of contract required for self-build, and the method of construction. Securing planning permission took five months, in part delayed from the usual timeline by the planning department's requirement for drawings additional to those initially submitted by Segal.

Segal was joined for the Lewisham projects by Jon Broome, who became his assistant throughout the works, and who also took on one of the Phase 1 sites in Segal Close, as a self-builder.[18] Segal and Broome worked closely with the self-builders, suggesting multiple layout options, but also encouraging their involvement in the designs (Fig. 21). It appears that while Segal was adamant that the builders could not change certain key details, or the fixed central core in the case of the phase 2 houses, he saw the broader configuration as very open. In both phases, every house was detached, allowing the self-builders to construct

their homes at their own speeds, independent of their neighbours. The plans were typical of the previous private commissions and built on the many refinements developed through them: they were small and very efficiently planned, with staggered layouts on the single storey houses to allow separation of living and sleeping areas. There was, however, much diversity of house types within the 14 units of this first phase, and when, following completion, a second phase for 13 two-storey houses was developed nearby in Honor Oak Park, in what was to become Walter's Way, a different approach was employed. In contrast to the variety of types in the first phase - 8 house types between 14 houses – here, the strategy was to have a standardised size, frame, and core, with a variety of layouts within the constraint of a two-storey, 80m^2 plan structure.

The construction methodology of the Lewisham houses was close to that of their privately commissioned forerunners: the layout of timber frame and foundations determined by the tartan grid of 600mm and 50 mm, that in turn was determined by the regular layout of the dimensionally coordinated woodwool slabs. Elevations were generated by a combination of the grid dimensions of the frame, the batten cover detail, and the particular layout of rooms, the facades a seemingly self-evident result of the construction logic and plan configuration. As before, the cover batten detail determined the distinctive visual appearance of the houses, both inside and out.

Drawn and written information followed the pattern established with the private houses, and was very much oriented towards clear, sequential on-site instruction. Segal and Broome also gave classes for the self-builders at the local Adult Evening Institute, teaching basic skills and the use of the small power tools that would be needed (Fig. 22). These were not general lessons in building skills, which, by necessity would have been much more involved, but were focussed on the essentials required for this fundamentally simple method of construction.

In addition, the self-builders met regularly at local pubs and community centres in the evenings, working independently on their own houses, but also collaborating for the many shared organisational requirements. During this process the group was formalised as the Lewisham Self-Build Housing Association. In contrast to many contemporary self-build programmes, which centred on male workers working together to produce houses sequentially, in Lewisham all members of families were encouraged to be involved, and each family constructed their own house in parallel (Fig. 23). Communal works, such as the laying drain runs and raising frames, comprised a smaller part of the works, and were undertaken on an ad hoc basis, in the spirit of unforced cooperation (Fig. 24). With the exception of the roofing contractors, brought in at Segal's insistence to lay the roof felt, all works were undertaken by the self-builders. Combining construction

with their working lives, and therefore building during evenings, weekends, and holidays, it was perhaps inevitable that they took very different lengths of time to complete their homes.

After the frames were erected, and stabilised with joists and beams, the roofs were constructed, providing the self-builders with a covered space for working and storage for the remainder of the build. Much of the material, such as the woodwool slabs and the Glasal external cladding sheets, was bulk bought together. Segal's approach was predicated on assembling materials in their market sizes, and, as such, had a certain vulnerability to changes in the market. During the phase 2 construction process, for instance, the building suppliers notified the self-builders that British Gypsum had changed the dimensions of its standard boards. With a construction methodology founded on the reduction of site alteration of materials, variations of this type were clearly problematic. However, by and large, there was tolerance provided within the construction logic that could accommodate some degree of variation; the key junction between woodwool slabs and the timber battens was indicative of this, allowing a degree of possible overlap and tolerance in the lining materials.

Twenty-seven houses were constructed in total within the two phases. Many self-builders were able to obtain homes they would not otherwise have had access to, and, despite the delays, frustrations, and the hard, physical work, those involved seem to have found it a profoundly rewarding experience. In the years that followed, the adaptability of the construction allowed the inhabitants to alter the internal arrangements and make external additions, ensuring the houses remained well-suited to their changing lives.

Over thirty-five years after their completion, few of the houses in Lewisham are now inhabited by the original self-builders. As the council shares and freeholds were bought out, and self-builders moved on, the buildings have gradually entered the mainstream housing market of purchase and sale. The sense of dwellings distinguished by being both designed and built by their inhabitants has become residual. Yet the communities formed are very evidently vibrant and friendly, and their urban character remains distinctly atypical of London, reminiscent of a country lane in the case of Segal Close, and a steeply sited Alpine village at Walter's Way.

Photographs of the projects when the residents first moved in suggest a strong visual coherence, but as the alterations and additions have accumulated over the years, the buildings now look less and less alike. A few, such as the elegant house built by Jon Broome in Segal Close, are carefully preserved as architectural artefacts (Fig. 25), but the majority have embraced an anarchic spirit of design freedom and are increasingly divergent in appearance (Fig. 26).

Fig. 25: 'Walter's Way'.

Fig. 26: Jon Broome's House at Segal Close.

Since their completion, the Lewisham projects have been much lauded within the architectural community as alternative housing models, regularly featured in news articles, and visited by students and practitioners. Yet, while Segal and his supporters in Lewisham Council never saw self-build as the sole solution to the nation's housing problems, there was undoubtedly hope that the projects might become models for a shift away from the dominance of market or council-led large-scale provision. Ever-increasing land values in the UK, together with changes in local government financing and the broader political climate, suggest any such shift seems less and less likely, and the houses remain an exception.

design of construction

> The most impressive thing about Walter Segal was not his wonderfully simple and logical building system. It was the way that, step by step in the last 30 years of his practice, he moved to a position which blurs the distinction between architect, builder and client. They aren't at the three corners of a triangular relationship, but are all mixed up in the middle of the adventure of building.[19]

Segal's views on the use and role of drawings developed radically during his career. His early drawings, evidenced particularly in the illustrations of *Home & Environment* in the 1940s, reveal an accomplished draughtsman.[20] In this text,

studies of plan typologies are accompanied throughout by precise line-drawn perspectives of both the interiors and exteriors of his proposals, and the drawings reveal the focus of the book: the nature of home as seen by the occupant. While the viewpoint is significant, so too is the careful composition and delicate line work by the author; they reveal a concern with the aesthetics of drawing.

As Segal's post-war career developed from design speculation towards production, his drawings' inevitable focus became the communication of construction information. Throughout the period of masonry building, this communication tended towards large drawing sheets, where as much information could be placed on a single page as possible, often resulting in projects that were encapsulated in a single sheet. Whilst compact, the information was dense and the sheets unwieldy. With the shift to timber-framed construction, and the search for simpler models of practice, Segal's drawings reduced in size. Project information now comprised drawings as layout and detail, with illustrated schedules, all at A4 format. The aim was for the drawings to provide the most legible and effective communication to build from, and the reduced size allowed ease of use on site; carpenter, clients and self-builders could easily fit the paperwork in files to take to and from site.

In earlier stages of the process, before construction, Segal encouraged the clients of his timber-framed projects to be involved in design decisions as much as possible. Forever seeking to impart greater autonomy, Lewisham self-builders were encouraged to draw their house plans themselves: Segal and his assistant Jon Broome, having explained the opportunities and limitations of the structural system, would provide the self-builders with gridded paper to establish their own layouts.

Segal's drawing style also became increasingly direct, communicating only that which was absolutely necessary, so as not to obfuscate, or confuse the process, and were now all produced free-hand over gridded underlays, allowing him to work faster. As the drawings became more and more oriented towards the act of building, the task of persuasion, sometimes necessary through architectural representation, became increasingly irrelevant to him.

Notably, his drawings submitted to the Lewisham planning department for permissions, lacking a full set of drawn elevations, were deemed inadequate, and eventually had to be supplemented by a series of detailed elevations by Jon Broome, and perspectives produced by the assistant borough architect, Brian Richardson. Perhaps the inevitable end result of this process of stripping away was that eventually the construction drawings were virtually dispensed with; while the first self-builders worked from Segal's information, later ones increasingly learned on site directly from their neighbours' experiences, through word of mouth.[21]

Despite his earlier accomplishment, in later life he claimed to dislike drawing, and in contrast to the polished quality of his earlier drawings, those of his later career appear starkly bare. At this late stage of his career, Segal appears then to have developed an ambiguous relationship with drawing, but this also extended towards his attitude to authorship. Having produced the generic details and base tartan grids, the individual houses required less and less of their own drawings, specific to each building. Instead, these projects could almost rely on a combination of the clients' input on layout, through their sketch drawings, together with Segal's standard drawings, details, and schedules. Keen to give clients a sense of ownership of their projects, he was clearly unconcerned with his sole authorship of the buildings. Yet he was by no means relinquishing design authorship. Instead, Segal can be seen as author of a construction methodology, and a way of thinking that represented a particular approach to building, with each project an opportunity for refinement and development. And this overarching authorship allowed a generosity to the authorship of the individual buildings, each sitting as they did beneath a broad umbrella of his design thinking; rather than a designer of the specific buildings, he became a designer of the wider process.

Segal's strategies of design and practice thereby suggest an alternative role for the architect.[22] He saw the buildings as not of his own making. Largely working without assistants or consultants, his support for others and his precise design advice were his key contributions. The independence and freedom that Segal sought in his own working methodologies, was representative of the way he assisted others to control their own circumstances. In his model of practice, the architect might support and assist in both project design and building construction, the architect operating as enabler. And so, while Alberti famously suggested that 'the carpenter is but an instrument in the hands of an architect', cementing in theory the separation of design and execution, in Segal's model of enabling his clients to build their own timber houses, this might instead be turned on its head, and rather read, 'The architect is but an instrument in the hands of the carpenter'.[23]

Segal's journey from the Highgate temporary house, via the house for Muriel and Michael Holland, to the Lewisham housing projects resulted then in a template for future self-builders: a readily accessible construction methodology that allowed them a significantly greater degree of autonomy. This was evident in the broad sense of allowing self-builders to become producers rather than consumers, and in the sense of seeking the demystification of construction as a form of empowerment.

But it also addressed and challenged much broader issues associated with the production of architecture. Over the course of his career, construction had become increasingly central to Segal's designs, particularly to the later, timber-frame works. His architecture was not a representation of an external idea, and Segal believed there was no need for expressiveness in his work. Instead, his architecture represented an index of its construction, with the artefact fully aligning with the process. He delighted in a down-to-earth proximity of architecture to building, and, as such, the later works emerge out of both a hard-won understanding of the building site, and an engagement with the inherent dynamism of site works. Eventually, the building site, with its rewards and frustrations, became the focus of the projects.

But the projects were also essentially dependent on works off-site. Segal's dramatic shift away from masonry building, following the construction of his own 'Little House in the Garden', represented a critique of traditional construction, a reaction to the slow and inherently cumbersome nature of the wet trades, and an embrace of a lighter way of working. And his achievement of extraordinarily low-cost building in his own house was predicated on an understanding of materials and labour costs: less labour and less skill were required in the construction of the house as a result of its construction logic and use of standardised, industrially produced materials and products. Segal's subsequent prioritisation of readymade materials and components, requiring little or no secondary adjustment, was, strictly speaking, distinct from prefabrication, but nevertheless, suggested that while site works were central to his thinking, an understanding of off-site processes was also integral. At this point, his designs might be considered as much assembled as built. Segal's was therefore an architecture of construction, closely identified with the practicalities of building, and encapsulating the logic of production. Yet his approach was not fully aligned with either works on site, or works off-site, with either craft or industrialisation. The use of hand power-tools on Segal building sites, used to fit purchased product to crafted carpentry, reveals this between-condition perfectly.

Prior to the impact of industrialisation, traditional craft construction was predicated on plentiful skilled labour and the accumulated knowledge therein.[24] From the nineteenth century introduction of new materials and production processes, through to their ideological adoption within the twentieth century, the process of industrialisation was utterly transformative of this skill basis. Machine production within the factory system reduced the requirement for skilled labour, temporarily creating surplus labour and cheapening its value, but in the process also reducing the subsequent development of skills.

Resultant shifts in the construction industry, while never uniform in effect, were nevertheless fundamental, resulting primarily in a circular logic whereby the increasing prevalence of factory-produced elements resulted in decreasing use of traditional skills, which in turn resulted in skill shortages, and a presumption of the need for a further increase in utilisation of proprietary products produced in factory environments. While the shift clearly favoured the capitalist model of production, it was also heralded by the predominant modernist thinking. Architectural evangelists of machine production contemporary to Segal, such as Konrad Wachsmann, were thus able to declare,

> The principle of industrialization requires that production be transferred from the building site and the workbench to the factory [...] Building becomes assembly, a process which is essentially different from all previous methods of construction and is conditioned by industrialization alone.[25]

Generally associated with a process of de-skilling, and the subsequent alienation of builders, a cultural consequence of industrialisation, was also the general invisibility of labour and the building site in histories of modern architecture. This invisibility is one with which writers such as Sergio Ferro have suggested architects are, indeed, wholly complicit.[26] But these processes also pushed architects away from building sites and away from direct contact with labour.

Segal's architecture recognised this historic shift away from craft construction and utilised the logic of standardisation. In particular, Segal's ideas on economy, or economy of means, took advantage of the changes in relative costs following industrialisation, as material costs decreased, and labour costs increased. But in his methodology, he seemingly challenges the alienation associated with the passage from craft to factory. He succeeds in utilising the standardisation resultant from industrialisation to create proximity to building site processes and to builders, in place of distance. As such, an understanding of skills is fundamental to his work: he accepted the broader, historic loss of craft skill as a given, yet within this context endeavoured to allow a wider uptake and development of building skills, democratising building construction as something available to everyone.

Segal's methodology combined simple site works with simple assembly of ready-made components, suggesting a new way of thinking about building process. His simplification of process led in turn to a closer relationship between design and construction. The design, far from being an abstract precursor, detached in thinking and personnel from a later act of construction, became enmeshed with it, and in this way, Segal developed a design not for production, but of production.[27]

In turn, Segal's alternative model of a reconfigured construction process provided a critique of established roles within the production of buildings; a suggestion that there might be alternative ways for how architects, builders and clients might operate and relate to each other. Here then, the division of labour was directly challenged, and separated design confronted. Designer and builder were no longer seen to be on opposing sides of conception and realisation. And so, while Segal's buildings, and the Lewisham projects in particular, are heralded for pioneering self-build, perhaps their broader relevance is in the manner in which ,through them, Segal challenged the separation between conception and execution. Present in embryonic form in his own temporary house, and fully realised years later in the Lewisham projects, this provocation hinged on the moment that Muriel and Michael Holland suggested to Walter Segal that they might take on the construction work of their new house in 1971.

notes

1 Pawley, Martin, 'Walter Segal's House' *The Architects'* Journal (20 June 1984), p.36.

2 Segal was born in Berlin in 1907, spent his childhood in Switzerland, and moved to London in 1936. His early life and education are well recounted in: John McKean, 'Becoming an Architect in Europe between the Wars' in *Architectural History*, vol.39 (1996), pp.124-146.

3 This phrase, and later subtitle, is derived from a section of text in Broome and Richardson's book: 'The Segal method is an approach that suggests how to build rather than a system of building. It is an attitude of mind based on a rigorous simplification of the whole building process, including design and documentation as well as the actual processes on site.' Jon Broome, and Brian Richardson, The *Self-Build Book* (Dartington: Green Books, 1991), p.187.

4 Walter Segal, 'Low-Cost Housing and User Participation' in *Architecture and social sciences: selected papers*, ed. P G Raman (Edinburgh, University of Edinburgh, 1973), p.115.

5 The house remained on site until 2016, when it was dismantled by the then owners.

6 Walter Segal, *Home & Environment* (London: Leonard Hill, 1948), p.64.

7 Further private houses designed by Segal after 1971 that also contributed to the process of design refinement: - Children's Home, Singleton, West Sussex. Completed in 1972. This project had cantilevering rooms beyond the frame. The building provided accommodation for children and staff in a T-shaped plan, and the site sloped, with the entrance placed at the higher end, and the living spaces at the lower, opening onto a large terrace raised high above the ground, and enjoying views towards the South Downs. The four bedrooms and living room that were arranged along the long elevation all extended over four feet beyond the last line of posts. As the cantilever beams were continuous from the adjacent structural bay, their extension limited bending in the timbers, allowing greater material efficiency. - Godfrey house and surgery/studio, Clifford, West Yorkshire. Completed in 1972. The bracing was brought into the house and incorporated between floor to ceiling within one of the internal walls, rather than beneath the floor beams. This change brought greater stability, but also altered the way the frames operated in plan. With the bracing beneath the floor level, the open frame offered unlimited flexibility for internal planning and a high degree of future adaptability. With the bracing now above, the design phase fixed a single internal wall encompassing the cross-bracing within the open frame of posts, and this wall became a permanent fixture within the layout, around which future alterations could be made. - Birch House, Barnet, London. Completed in 1977. This was a two-storey house with a pitched roof. - Green House, Bedfordshire. Completed in 1979-80. This was a two-storey house. - Romilly, Herefordshire. Completed in 1980. The clients here were Brian & Maureen Richardson, Brian having been deeply involved in the Lewisham self-build projects in his role at the council.

8 Gilbert Herbert, *The Dream of the Factory-Made House: Walter Gropius and Konrad*

Wachsmann (Cambridge, Mass: MIT Press, 1984), p.7.

9 Finnimore's study of system building identifies the way research and development architects during this period could only initiate development where manufacturers stood to profit, yet for reasons of competitive advantage these commercial sponsor's 'instinct was to design systems in which only their components could be used.' Brian Finnimore, *Houses from the Factory: System Building and the Welfare State 1942-74* (London: Rivers Oram Press, 1989), p.148.

10 Christine Wall makes clear that this degree of modular co-ordination in part resulted from both concerted industry effort and government policy. In particular, she highlights the role played by the post-war school building programme, and notes that, 'from 1963 onwards, a series of design guides on dimensional co-ordination for industrialised house building had been published by the MHLG (Ministry of Housing and Local Government).' Christine Wall, *An Architecture of Parts: Architects, Building Workers and Industrialization in Britain 1940-1970* (London: Routledge, 2013), p.147.

11 Around this time, Great Britain switched from imperial to metric measurements. Metrication in construction lasted from around 1969-75, and Building Regulations were amended to accommodate the change in 1972. Segal's drawings over this period can be seen to switch accordingly.

12 Muriel Holland, in conversation with the author, 30 August 2023.

13 Michael Holland, as recounted in, John McKean, 'A certain basic satisfaction in building a shelter for oneself' in *Architects' Journal* (3 September 1975), p.458.

14 *Learning from The Self-Builders / Walter Segal*, produced by Monica Pidgeon (London: Pidgeon Audio Visual Library, Dec 1983).

15 In Segal's later telling, after observing the two carpenters work on the first day of the job, the client called Segal and said the men weren't required and that they themselves would complete the works. However, this seems

to have been something of an exaggeration on his part, and Muriel Holland recounted that the carpenters did in fact complete the frame. A TV programme was broadcast soon after completion, focussing on the house and included interviews with the Hollands. In this Michael Holland suggests that the carpenters completed the erection of the frame in the first two days. 'Science Session', *BBC School*, 1972.

16 Muriel Holland, in conversation with the author, 30 August 2023.

17 As narrated by a Phase 1 Lewisham self-builder for *Open Door*, 'The House that Mum and Dad Built (You can do it too!)' aired 10 April 10, 1982, BBC.

18 Jon Broome went on to establish the architectural practice, Architype, and has written extensively on Walter Segal, including the following texts: 'AJ Special Issue: The Segal Method' *Architects' Journal*, 5 November 1986, and Jon Broome and Brian Richardson, *The Self-Build Book: How to Enjoy Designing and Building Your Own Home* (Dartington: Green Books, 1991).

19 Colin Ward, 'Walter Segal 1907-85' in *Architects' Journal* 182, no.45 (6 November 1985), p.30.

20 Segal, *Home & Environment*, pp.37,111.

21 Walter Segal commented on the self-builders' contributions: 'This whole experience has taught me personally an awful lot about human beings. It has taught me an awful lot about the ability which, provided the methods of construction are not overbearing, can be brought to the fore, and where people can discover in themselves all kinds of talents which in their former lives, they had absolutely no opportunity to use.' Segal, Learning from *The Self-Builders*.

22 Segal's views on the architect as enabler were articulated in: Charlotte Ellis, 'Segal's first half-century in practice' in *Architects' Journal* 175 no.14 (7 April 1982), p.36.

23 Leon Battista Alberti, *On the Art of Building in Ten Books* (Cambridge, Mass: MIT Press, 1988), p.3.

24 Harry Braverman commented: 'From earliest times to the

Industrial Revolution the craft or skilled trade was the basic unit, the elementary cell of the labor process. In each craft, the worker was presumed to be the master of a body of traditional knowledge, and methods and procedures were left to his or her discretion. In each such worker reposed the accumulated knowledge of materials and processes by which production was accomplished in the craft.' Harry Braverman, *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century* (New York: Monthly Review Press, 1974), p.75.

25 Konrad Wachsmann, *The Turning Point of Building: Structure and Design* (New York: Reinhold,1961), p.11.

26 The texts of Sérgio Ferro are significant in highlighting this omission. Kapp, Lloyd Thomas and Almeida Lopes writing in their introduction to his text, 'Concrete as Weapon': 'For Ferro, the lack of attention given to architecture's production is not just an oversight; theory has been complicit in rendering these questions invisible and apparently irrelevant for the field.' Silke Kapp, Katie Lloyd Thomas, and João Marcos de Almeida Lopes, 'How to Look at Architecture from 'Below', in *Harvard Design Magazine* No. 46, F/W (2018), v.

27 Sérgio Ferro distinguishes between these two terms, suggesting design of production might rather be limited to the techniques of production, and be defined by its immediate producers. Sérgio Ferro, *O Canteiro e o Desenho* (São Paulo: Projeto, 1979).

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