Working Class Flats in the 1930s: Steel versus Concrete

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INTRODUCTION

Although the horrors of the slums featured prominently in Lloyd George's famous "Homes fit for Heroes" speech in the election which closely followed the 1918 Armistice, the long-promised offensive against slum housing had to be delayed for a decade. The immediate post-war priority was the rapid delivery of large numbers of additional dwellings to recover ground lost in the pre-war house building slump and the virtual cessation of domestic construction between 1914 and 1918. Only by meeting the immediate and pressing shortages, it was felt, could unrest be countered. More houses fast were needed in 1919-20 and efforts were concentrated on the construction of standardised two-storey houses on the outskirts of large cities. There, relatively cheap virgin sites could be laid out on the Garden City principles advocated by most housing experts. Here too some of the more promising non-traditional housing systems could be employed to meet the shortages of bricks and construction labour which threatened to torpedo the Government house-building drive. A large number of new systems had been rushed onto the market in the post-war crisis – everything from "flat pack" Scandinavian timber frames to steel systems – most of them claiming to make use of unskilled labour as well as alternative materials. Most proved to be of dubious value: a few were disastrous. The Dorlonco steel-frame with its sprayed concrete skin provided one of Britain's most spectacular early set-backs in the use of non-traditional systems: while the prefabricated iron-panel house promoted by Lord Weir provoked a major confrontation with the construction unions. Although both steel and concrete feature in practically all forms of construction, the house-building programme which finally got into its stride in both public and private sectors during the second half of the Twenties made relatively little use of either material.

By the end of the Twenties Government attention was able to focus on the replacement of slums. Arthur Greenwood, Minister of Health in the short-lived Labour administration of 1929-31, steered a bill through Parliament which provided subsidies based, not on the number of new dwellings, but on the number of persons re-housed from demolished slums. It was a measure well suited to the severely congested districts of multi-occupied dwellings likely to be pulled down, and it was to be developed in subsequent anti-overcrowding legislation until the eve of World War II. But by then the climate had changed. The flatted blocks which ten years before had been seen as a solution of last resort were now a hot topic for discussion in government, local authorities, the architectural and engineering professions and – not surprisingly – amongst the materials manufacturers and fabricators who saw in them exciting new opportunities for their products.

This paper is concerned primarily with the design and construction of working class flats in this later period, and the different methods employed by the steel and concrete industries to promote their products in connection with what was seen as a potential new and profitable area of work. How they did this, and what this can tell us about the political nature of development in one corner of architecture, housing and construction are some of the topics discussed. Underlying this discussion, however, are questions about the role played by commercial interests in furthering certain kinds of architectural solution, in this case multi-storey flats.

The relative market positions of steel and concrete in this period have been discussed by Marian Bowley who pointed out that, although it offered no cost advantage, steel enjoyed a much greater share of the market for framed buildings than did concrete. (Bowley 1966). This can be partly explained by the greater simplicity in the design of steel frames, and the fact that engineers (and to a lesser extent architects) were generally familiar with steel frame design. Bowley also put it down to the much more centralized marketing strategy adopted by the steel industry, versus the fragmented approach of the concrete fabricators. This finding goes directly to the substance of our paper and obliges us to examine the relative homogeneity of the suppliers, erectors and designers of steel versus those of concrete. Before turning to this topic, however, it may be helpful briefly to review the state of the art in British flatted block construction during the 1920s.

MANSION BLOCKS

The ideal of living in flats was to be developed in the late-nineteenth century in the private sector mansion blocks which, after further evolution, became such a feature of London building between the wars. So much so that in 1934 the journal *Building* devoted its August issue to flat design and T. P. Bennett, who had been responsible for a large number of mansion blocks in London contributed an article on their planning (Bennett 1934, pp. 290-91). The flatted way of life was sufficiently well-recognised and trendy to be lampooned by Osbert Lancaster, but there was substance too in the claims of mansion block promoters to offer their tenants an altogether more modern urban lifestyle, with a new open-ness in the planning of what were often very small spaces and a higher degree of servicing than in most low rise housing for comparable socio-economic groups. In central areas, ground floor shops or showrooms were common, as was car parking. Lifts were also a *sine qua non* in private blocks which reached up to 9 or 10 floors by exploiting to the full the rules set down in the London Building Act which allowed a height of 80 feet to the cornice plus two more floors in a set back or mansard roof space. Lifts were often duplicated in the manner of Victorian or Edwardian country houses to allow separate residents' lifts starting in the lobby, as well as service lifts for deliveries and domestic staff. Private residents could be trusted to operate lifts without attendants, although the better-staffed mansion blocks included commissionaires, lift operators, and porters, and often a restaurant which would deliver room-service meals. Central heating was increasingly to be found in the better quality private blocks between the wars (although not always in the cheaper suburban flatted developments). Private blocks still often provided open fireplaces, but this was increasingly likely to be supplementary heating for show, and was most frequently to be found in flats with a semi-private suite for a living-in maid, and separate service

lifts and stairs. Making-up fires (to say nothing of clearing the ash) was no work for the lounge lizards of Lancaster's cartoons.

In this context concrete was the newcomer. The taller London mansion blocks of the 1920s generally used steel frames, cased in concrete for fire-protection of course, but clad either in brickwork, or ashlar over brickwork. The frames allowed considerable planning flexibility between floors, and the open spans needed in the lower levels for offices, shops and car parking. All of this could be done in reinforced concrete, of course, and more. Only later did reinforced concrete become the material of choice for leading edge designers and in the 1930s yielded a number of "signature" concrete housing schemes which not only used concrete frames but often exploited the plastic potential of the material and expressed it overtly on the exterior (Yorke & Gibberd 1937).

The real advantage enjoyed by steel resided in the fact that standardised sections were available for both specifiers and contractors. Steel fabricators all used the same material produced by the rolling mills and so a centralized marketing organization – as suggested by Bowley – was certainly feasible. But there were technical developments in steel construction which also contributed to its market success. By the Thirties welding was making it possible to build frames using light rollings welded together to form beams and columns, rather than the larger rolled sections used previously and bolted or riveted through connection plates. Welding and what were known as "light steel frames" allowed some economies in the use of steel, but structures still needed to be encased in concrete to provide fire protection.

In sharp contrast, reinforced concrete developed as a number of patented systems each with their own type of reinforcing bar. Many of these were developed for floor construction, which was used in conjunction with steel frame buildings, although the most successful companies developed their systems for the construction of frames. Their marketing strategies differed radically, the differences being exemplified by the Hennebique and Kahn systems. Hennebique, a French company, worked entirely through licensed contractors who provided the detailed design of the frame. The designs were carried out by Mouchel and Partners, Hennebique's agents in the UK. The Kahn system of reinforcing bars was sold as just that, so that the structural design could be provided by anyone. However, the Trussed Concrete Steel Company – Truscon – would often provide a design and build service using these copyright-protected reinforcing bars. This difference in marketing strategy can be seen clearly in the house journals produced as a marketing aid by the two companies. *Ferroconcrete,* the journal of the Hennebique company, was simply promotional, illustrating buildings constructed using their system and extolling its virtues. No technical information was provided because Mouchel and Partners would do the design. In contrast *Kahncrete Engineering* provided technical information to help other engineers using their special Kahn bar.

The Cinderella of the construction materials, concrete was to become the darling of Modernists in the architectural profession through the construction of a small number of pioneering projects for private developers and what today we would call housing associations; Wells Coates's Lawn Road flats, Hampstead, and the same architect's Embassy Court, Brighton; Tecton's Highpoint I and II,

Highgate, and the firm's pre-war designs for Finsbury council; Connell, Ward and Lucas's Kent House, Camden Town; Maxwell Fry's Sassoon House, Peckham; and the so-called Kensall House Urban Village, Kensington, all served to place concrete architecture forcefully in public consciousness (although not so strongly in their hearts) and to win a place for it in the history books as a standard-bearer for Modernism. This prominence can lead to the belief that concrete had achieved some form of market dominance. However, as Marion Bowley's analysis confirms, such an impression is probably misleading. In the local authority sector a number of factors militated initially against both concrete and steel.

LOCAL AUTHORITY FLATS

Flat-building by local authorities in the Twenties was concentrated overwhelmingly in London, and in Liverpool which alone amongst British provincial local authorities demonstrated a commitment to flats amounting to real enthusiasm. A number of other major city councils who were to win fame (and later still notoriety) for their 1930s flats set their faces during the 1920s firmly against multi-storey housing. In inner-London, however, the shortage of suitably priced sites – even in slum districts – meant that there was little practical alternative to flats. Just before the Great War, The London County Council (LCC) had adopted a model 5-storey block, employing gallery access (so that two stairs could serve up to a dozen front doors on each floor), and load-bearing brickwork. The 5-floor model was a product of two factors: (a) what was considered to be the maximum safe walk-up access and (b) the ability to employ 9 inch brickwork on the highest storeys, over 13 inch solid walls on the middle levels, and 18 inches on the ground floor and below.

When the LCC sub-committee on construction reviewed their tenement designs just after World War I the committee was reminded that the 5-storey model had been adopted partly because it allowed economical brick thicknesses in load bearing walls. A subsequent relaxation of the London Building Act allowed 5-storey buildings (with one storey in the roof) to be erected with 13 inch outside walls throughout, and Grey Wornum, lecturing at the RIBA in 1931, suggested that "this appears to be the economic height to build at present." (Wornum 1931, p. 438) Best known today as architect of the RIBA headquarters building, Wornum was an expert on low cost housing and had recently completed (in partnership with Louis de Soissons) the first sections of what was to have been a very large slum redevelopment, the Larkhall Estate in Clapham. This was the brainchild of Sir Theodore Chambers, a leading Garden City man, who wanted to build an inner-city flatted estate on garden city principles. Chambers stressed the importance of a large site on which to build this kind of scheme (Chambers 1929, p. 7). Wornum's belief in 5-storey load-bearing brickwork as the most economical solution was not seriously to be shaken in social housing circles until after World War II and local authority flatted blocks – with very few exceptions – were constructed in load-bearing brickwork with concrete floors between units.

The 5-storey gallery-access model (occasionally raised to 6-storeys with a maisonette on the top two floors), also remained the LCC standard throughout the inter-war years and was closely

followed by other local authorities. The possibility of higher blocks was seriously explored by the LCC in the early 1920s in an effort to achieve greater densities, but was not followed up at that time because of the perceived need to equip blocks of more than 6 storeys with lifts and – this being working class housing – lift attendants (the latter being as costly in the long term as the lifts themselves).

Both the LCC and Liverpool City Council also considered what today would be called "high rise" flats; blocks of up to 10-storeys with lifts. None of Liverpool's high-rise proposals got beyond the drawing board. Neither did the LCC's original proposal for the Ossulston Street site in St Pancras, which was the most advanced and imaginative of all these early proposals, involving at one stage a design which would have placed working class flats over private sector apartments, offices, shops and commercial car parking: the profits on the private sector parts of the scheme being designed to offset the losses on the expensive working class housing. What might be called the "mixed economy" of this proposal was of course fundamental to the construction of many of the private sector blocks.

The Ossulston Street scheme was vigorously opposed by left wing commentators who saw in it a return to the hated Victorian "barrack-block" tenements. However, it was legal objections to the role of the council as landlord to a range of commercial undertakings which killed the project, and a much reduced entirely working-class version was eventually built in rendered brickwork. (Pepper 1981, pp. 45-64)

PLANNING, STRUCTURE AND MATERIALS

In terms of block planning some key differences emerge between the sectors. The designers of working class blocks were not generally allowed to plan flats on each side of an internal corridor, because to do so would prevent the through ventilation considered essential by medical authorities still condemning back-to-back houses. This form of plan was often adopted in private sector dwellings although T. P. Bennett deprecated the practice in his "luxury" sub-sector. Without corridors, however, a very limited number of flats could be served from staircase landings. Only in the small number of high quality improved council flats developed by the LCC and others in the late 1930s (and for which 50% higher rents were charged) did enclosed staircases serve the two or three flats on each landing. Hence the almost universal use of the unpopular access galleries, which were open to the weather, which overshadowed most windows on one side of the block and which, by allowing strangers to pass close by what might well be open windows, contributed to the loss of privacy which was one of the most disliked features of this class of housing. Lifts could of course be used with external access galleries (and in post-World War II housing often were) but, as we have seen, here the objections were mainly social. Lack of lifts, and heavy reliance on single-loaded open access galleries, meant that working class flats were locked into a model of tenement planning which was being fast left behind by developments in the private sector.

As Sir Theodore Chambers's discussion of the Larkhall Estate had shown, flats became a feasible solution where sufficiently large sites could be assembled (opening the door both to the "garden estates" that he promoted and to a phasing plan whereby a high proportion of the residents displaced by slum clearance could be re-housed within the project). During the first six months of 1934, moreover, the Government committed itself to a policy under which the generous Greenwood subsidies would be available only for blocks of flats on cleared sites in central areas (Laybourn 1990, p. 82). This highly restrictive policy was quickly modified in response to pressure from the local authorities who were opposed to flats, and who often argued that in their districts it was unnecessary to build them because of the relatively proximity of cheaper suburban sites. By August 1934 Government had decided that the subsidies would continue to be available for suburban replacement units, and measures were put in hand to ensure that the low-density replacements were in fact earmarked for occupation by former slum dwellers. However, for a critical six months (and for some time afterward when uncertainty still existed) local authorities were drawing up plans for their slum clearance and anti-overcrowding programmes in the belief that an enforced policy of flat design on a very large scale might well favour steel and concrete over load-bearing brickwork, or at least put all these systems on an equal footing. There were moves in 1934 by both concrete and steel commercial interests to demonstrate this possibility.

The rivalry between the different reinforced concrete interests meant it was simply not possible for there to be a co-ordinated approach. The only common feature of these various systems was the cements that they used and it was left to the Cement Marketing Company (with the distinctive Blue Circle logo on their vehicles) to promote their common interest in demonstrating the potential of reinforced concrete as a material for working class flats. This they did through the Working Men's Flats Competition of 1934-35.

THE CONCRETE FLATS COMPETITION

When the *Architect and Building News* reviewed the conditions of what they called the "Concrete Flats Competition" (Nov 16, 1934, p. 202) reference was made to earlier contests organised by the Cement Marketing Company which had yielded disappointing results, in that their "object of making making architects and the general public 'concrete minded' (to use the current jargon)" had been frustrated by the fact that "most of the designs submitted which have had any architectural merit have failed to be as distinctively and essentially concrete as the promoters no doubt hoped." These results seem to have been so disappointing, indeed, that they did not attract the notice of the architectural journals. The journal went on to praise the conditions and the appointed assessors of the 1934-35 competition for their insistence on cost-comparability with other forms of construction, the emphasis on acoustics and insulation, and the encouragement given to architect and engineer collaborations. The subject, it opined, was so much "in the air" that a good entry was to be anticipated. Competitors were given a theoretical rectangular 4-acre site and required to provide 200 flats, with 65-70% of the accommodation in three roomed (i.e. two bedroom) flats or smaller, and a

combination coal fire and range in the living room (a condition which was ignored by the winner). All of these conditions were criticised by Elizabeth Denby, the housing expert retained by the journal to comment on the designs.

123 designs were submitted, of which nine schemes were published as winners of prizes or commendations. The entries were all exhibited at the Imperial Institute, South Kensington, at the end of March 1935. The winner was Lubetkin and Tecton, in partnership with the civil engineer, Ove Arup. Their scheme consisted of four identical blocks, laid out North to South to ensure year long periods of daylighting to rooms on both sides of the blocks (bedrooms facing east and living rooms west). The blocks were separated by open spaces containing tennis courts and a single storey laundry and social centre. Tecton's design stood out from all but one of the others in its use of staircase access (each stair serving two flats per landing but apparently costing only £250 more on the whole scheme, by their own estimate) while the other illustrated schemes used open access galleries – often making a striking feature of the long horizontals. What probably won Tecton the competition, however, was their use of the new lift shuttering "which has only recently been brought out, but which has proved extremely successful on an important building in London." This was their Highpoint I project that had been extensively publicised (Yeomans & Cottam 1989, pp. 183-88). The system offered speed of construction (it was claimed that the whole project could be completed in 50 weeks), an excellent wall surface (no marks from wires or bolt holes) and, it was stated by the assessors, low cost. "The moving of the shutters from one position to the next is a very simple operation for which skilled men need not be employed." (Assessors' Report in A&BN, March 21, 1935, p. 443.) Tecton's scheme did indeed demonstrate how modern reinforced concrete construction could liberate the designer from the constraints of load bearing masonry. The "frame" consisted of floor plates with downstands below and above windows and a third single internal downstand forming a spine, with vertical supports in walls and the staircase cross walls at 90 degrees to prevent racking. The central row of piers and the downstand was concealed in a strip of storage cupboards servicing rooms on either side of the block. There was no overt Corbusian demonstration of columns, but the architects allowed themselves some fun with the balconies, which cantilevered out behind an upturned concrete parapet ("to protect users from the wind") with the gaps at the ends railed for safety, but open to allow tenants to sweep dust off them (or so the designers claimed).

THE STEEL INITIATIVE

The Cement Marketing Company probably felt compelled to make this promotional effort because of that of the steel lobby which had begun a year earlier. On June 13, 1933, a meeting of industrialists at the Chartered Surveyors' Institution had formed itself into the Council for Research in Housing and Construction (CRHC). The credibility of this body resided in the assembly of luminaries and representatives of significant organizations. The Earl of Dudley, a prominent steel owner, was elected chairman and shortly afterwards Mr C. J. Kavanagh of the British Steelwork

Association (BSA) was appointed Director. CRHC shared offices with BSA in Artillery House, just off Victoria Street. The other major stakeholder was Imperial Chemical Industries (ICI), a company with an interest in a wide range of building materials (sheet roofing, asbestos insulation, chemical additives, paints and waterproofing, to name but a few). ICI was headed by Lord Melchett, formerly Sir Alfred Mond MP, who thirteen years earlier had briefly headed both the Office of Works and the Ministry of Health in Lloyd George's coalition government, when he had formed strong views on the political and commercial importance of housing. Lord Melchett and Dr Coates from the research side represented ICI on the Council, together with representatives of local government, construction, other steel interests, gas and electricity bodies, the architectural profession, civil engineering and surveying. Four of the architects to the LCC, Liverpool, Sheffield and Manchester were enrolled as "consultant members". CRHC also appointed an "editorial consultant" to coordinate the publication of the first of the Council's reports. John Dower, a Cambridge graduate and architect then still in his early thirties, was already known as a designer of social housing and was to build a formidable reputation as a wartime civil servant before his premature death in 1947.

Almost exactly a year later John Dower's team produced their first report, *Slum Clearance and Rehousing* (1934), a substantial and authoritative volume on the achievements of post-1919 housing, its problems (notably the failure of successive campaigns actually to tackle the most intractable housing problems rising from slum property and extreme poverty), and support for the National Government's attack on slums and over-crowding. CRHC made the case for a system-based approach to housing production which brought technology to bear on the problem, with emphasis on cost reductions by speeding up site processes, factory-based production of components, and of course the potential for steel framing. A number of contemporary foreign schemes were reported in an illustrated section: notably Mopin's system completed at Bagneux and still under construction in Drancy, in the Paris suburbs, as well as a number of German schemes. Pride of place was given to the 9-storey steel-framed "Bergpolder" block at Rotterdam, designed by Brinkman, van der Vlugt and van Tijen, which was also still under construction when visited by Dower's people (Yorke & Gibberd, 1937, pp. 41-45; Grinberg 1977, pp.124-26). Bergpolder was hailed as "perhaps the boldest experiment yet made in the technique of tenement building." (*Slum Clearance*, p.51.) Without scaffolding and using an enormous railway-mounted gantry which easily cleared the 27 metre tall structure, the steel frame for a block containing 72 flats was raised in 3½ weeks, providing "a remarkable demonstration of the increased speed made possible by modern construction." Steel sheeting, backed by insulating material, was used for external walls. The Rotterdam Bergpolder block, in fact, was the closest to an "all-steel" high-rise building Europe had yet seen.

What was now needed was an all-steel housing project in Britain. The challenge was taken up by the Sheet Steel Market Development Committee, an offshoot of CRHC, and by the Gas Light and Coke Company, which was represented on CRHC. The Gas Company had battles of its own to fight against electricity, and sought opportunities to sponsor publicity-generating modern design. The

company provided a site for employee housing at the Battlebridge Road gasworks, King's Cross, where John Dower designed and built a small 2-storey steel-framed block of four flats which opened in 1937. The external wall surface was brickwork, but inside the cavity a variety of skins were used including breeze blocks, hollow clay tiles, and hollow box panels of dovetail "wrinkly" steel sheets, the dovetails providing both strength and a key for plaster. Box-section planks in the same dovetailed steel were used for the intermediate floors and roof; together with pressed steel stairs, rubbish chute, kitchen equipment, bathroom fittings and windows. The scheme was of course "all gas." Although presented as "demonstration flats" the publications emphasised the research planned on heat loss and acoustic performance (but to our knowledge no reports on these topics were published).

As reported in the *Architects' Journal* (September 2, 1937, pp. 366-69), the flat types had been designed with blocks of from 5 to 10 storeys in mind, while the CRHC *Slum Clearance* report argued that the 10-storey blocks would be necessary if large scale slum clearance and redevelopment operations were not going flounder on the inability to re-house at sufficiently high densities on cleared sites. In support of this case, CRHC illustrated the design of a 10-storey cruciform block, with lifts and stairs clustered at the central crossing point. Such thinking was clearly not regarded as unrealistic. A similar cross-shaped block had been proposed in Liverpool in the Twenties, and as the CRHC was being drafted in 1934 plans were unveiled for 10-storey light steel framed blocks designed for Stepney MBC by the firm of Adshead & Ramsey. Both the Liverpool and Stepney schemes were conceived as "clearing houses" – permanent schemes designed to be temporarily occupied by relays of displaced slum residents before long-term re-housing was found for them. The Liverpool scheme was never built, but that for Stepney was completed in 1937, by then reduced to 6 storeys, but retaining the light steel frame, the passenger lifts and other services which made it one of the most advanced of all inter-war blocks of council flats. Even so, it received relatively little attention from the professional press, despite the fierce political controversy the original 10-storey proposals had generated in the East End.

The one steel-based scheme that attracted public attention was Quarry Hill, Leeds, a composite of structural steel frame and precast concrete cladding. Leeds had previously and consistently set its face against the use of multi-storey flats and had only agreed to build this scheme as a "clearing house" in early 1934 when, as we have seen, there was confusion about the Government's future policy on slum clearance subsidies being confined to multi-storey flats. Nevertheless it became probably the most famous block of working class flats in Britain.

The Mopin system used here was a French invention and, like many of the housing methods that had been produced immediately after the Great War, was an example of what would later be called a "closed system." This did not stop Leeds City Council from modifying it, whether to meet the requirements of British by-laws or to suit the whim of the city is not known (Morris 1978, pp. 53-57). The difficulty with the by-laws was a structural one in that the light steel structure was not

capable of carrying the loads unaided and relied upon the *in situ* concrete which protected the steel. It proved neither rapid in construction nor satisfactory in performance. It was not completed until 1940, while serious problems with the buildings first appeared as early as 1954 when cladding panels were found to be in danger of falling. It was demolished after less than forty years of useful life.

THE HUMPHREY'S COMMITTEE

Already in July 1934 a committee had been formed under the chairmanship of the recently retired chief engineer to the LCC, Sir George Humphreys, "to enquire into and report upon materials and methods of construction suitable for the building of flats for the working classes with special reference to efficiency and cost." The Humphreys Committee was organised on lines very similar to those used by Lord Dudley's CRHC, with a central committee of 16 members, and specialist sub-committees on planning, acoustics, fire, habitability, equipment and structures. But the membership was very different, being heavily weighted towards professional architects, engineers and scientists. It included Launcelot Keay (who had shown interest in high-rise concrete flats for Liverpool) and Stanley Ramsey (a strong advocate of steel as well as high-rise) but as a departmental committee of the Ministry of Health steered a neutral course and attempted – without much success – to compare the costs of a range of construction systems for multi-storey flats, and concentrating in their final report on what they recognised to be major practical problems of fire protection and acoustic separation (Humphreys 1937).

Doubtless the Humphreys Committee was set up to provide an authoritative voice in the face of competing and obviously vested interests. Members of the committee were not immune from such interests: Keay and Ramsey helpfully providing details of, respectively, the concrete scheme proposed in collaboration with Truscon for circular 10-storey blocks in Liverpool, and the 10-storey steel frame scheme for Stepney. Proposals which looked promising in 1934 had however been much modified by 1937 when the committee reported. In these circumstances Sir George Humphreys's neutrality seems well judged prudence. Not for the first time in construction history, it proved extraordinarily difficult to make sensible cost comparisons between different methods of construction – the more so when many of them were still under development. How this would have been resolved remains an academic question in the light of external circumstances.

By the eve of World War II it was becoming clear that the national re-armament programme presented the steel industry much bigger marketing goals than replacement flats for the slum clearance programme. Flats themselves began to be seen as a form of housing that was particularly vulnerable to bombing. It was the bombing and the later V1 and V2 campaigns, with their haphazard pattern of damage, that provided many sites that would see high density and sometimes high rise blocks in the late 1940s and 1950s. By the late 1940s, when Britain began to build again, there was another steel shortage as Britain and other countries rebuilt their naval and merchant

shipping fleets and rearmed themselves once again for the cold war. Blocks on Westminster City Council's massive Pimlico housing scheme (later Churchill Gardens) which had been designed as 10-storey steel frames had to be re-designed in reinforced concrete. The LCC's first 8-storey blocks at the Woodberry Down estate, Stoke Newington, were designed in concrete for the same reason. Events, as Harold Macmillan might have said, were what determined the choice of structural materials in Britain's brave new world after 1945.

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