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The Editor will be glad to receive MS. articles and also illustrations of current architecture in this country and abroad with a view to publication. Though every care will be taken, the Editor cannot hold himself responsible for material sent him.

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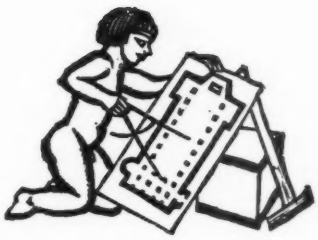
1640 — 1940

Lambeth, left, and Millbank in 1640 : a reproduction from an old coloured print. The kilns on the Lambeth side probably belonged to Dutch potters and mark the approximate site of Doulton's new building, designed by T. P. Bennett and Son and illustrated on pages 160-167 of this issue. The site of the new building is at the foot of the south side of Lambeth Bridge. Westminster Bridge is approximately in the position from which the picture was executed.

THE BORDERS CASE

On January 29, Mrs. Elsy Borders' appeal against the dismissal of her counterclaim in the original action was allowed by the Court of Appeal. The hearing is reported on page 159. Above are Mr. and Mrs. Borders, and on the left is the house at Kingsway, West Wickham, Kent.



MRS. BORDERS AND YOU

THE Borders case, of which the first hearing began a year ago, reached a further stage on January 29 when the Court of Appeal found for Mrs. Borders on her counter-claim.* Simultaneously, it has been announced that between 1918 and the outbreak of this war over four million houses and flats were built : just over one million by local authorities, the remaining three million by private enterprise.

Just now architects have time on their hands, and some of them have been examining the public relations of the profession—whether it has helped and informed the public as it should on matters concerning building and what improvements are desirable. For architects who think of these things, the four million houses and the Borders case provide between them all the evidence needed.

Architects since 1918 have slowly increased their interest and exerted their influence in State-aided housing : until today it is firmly fixed in the public mind that State-aided housing needs the services of skilled architects. But what of the other three million ?

After a few attempts architects have abandoned interest in all houses between those that are State-aided and those costing over £1,000, or (more usually) over £2,000, each. The profession has not examined the financial and other methods by which the remaining 2½ million were supplied and has made no attempt to warn or guide the public in a matter so fundamentally affecting all the profession stands for. In fact, it has washed its hands of building works which cost in all about two thousand million pounds.†

This is a large sum ; and a very short review of how those houses were supplied shows that there were several points in the changing process at which the profession could and should have made its influence felt.

The building was financed by building societies, which advanced to the tenant-purchasers a proportion of the purchase price on the security of the various houses, and thus performed an essential service.

To begin with, purchase prices were fairly high, the advance made did not usually exceed three-quarters of the price, and both building societies and purchasers ensured a reasonable standard of building by independent inspections by their own architects or surveyors. Perhaps half, perhaps more, of the houses were thus built to the benefit of all parties to the transaction.

But, after a time, the market for more expensive houses was filled and it became necessary to seek other employment for great capital and building resources. This was done by supplying cheaper houses ; and as prices fell complications began.

The new type of tenant-purchaser could not put down in ready money one-quarter of even £800. To attract him, building societies (in competition with each other) offered ever greater proportional advances—reaching 95 per cent. in the end. Building societies were also aware that an £800 house was not as good security over twenty years as a house twice the price ; and tenant-purchasers of such houses were occasionally financially unreliable. How were the societies to protect themselves ?

They did so, in many cases, by continuing to throw all responsibility for repairs on to the tenant, and by the much more important device of *collateral security*. This collateral security meant that the building society kept back from the builder a certain proportion of the purchase price, which was put in a " pool " for the sole use of the society and often without the tenant's knowledge. Thus, when a builder had built 250 houses by arrangement with one building society and the latter had kept back £20 per house, a sum of £5,000 was available to the society solely for its own security against defects which tenants could not be induced to pay for.

The unfairness to tenants which could arise in such cases is well known, and many instances were cited in the Borders case. Tenants knew nothing of building and would never have dreamt of employing anyone to examine their houses before purchase : and knowing nothing of collateral security, they relied upon the fact that a big building society was ready to advance 95 per cent. of the price of the house.

That some thousands of badly-off people have suffered great hardship as a result has been proved by tenants' strikes and the quick passing of the Building Societies Act, 1939, which lays it down that the amount of the collateral security shall be declared to the tenant and a somewhat vague warranty of good value shall either be given or else explicitly withheld.

Such, in outline, is how 2½ million houses were built. Architects will notice that, from a good beginning, the methods, in part at least, changed until no one—except the too ignorant purchaser—was left with an interest in decent building.

Architects are interested in decent building—it is one of the aims of their profession. But the profession did not step in to help and warn the ordinary purchaser when the collateral security system began. And no one with knowledge of the helplessness and hardships of thousands of tenant-purchasers can be in doubt about the prestige and good will which the profession has lost by its failure.

Travelling exhibitions do not reach the ordinary man. Simple, short bulletins on matters of concern to his everyday life could and would. *Bulletin No. 1 : Buying a Small House ;* and *Bulletin No. 2 : Frost and the Pipes* (published in October) are only two examples of explanatory pamphlets which could portray the architect to the public in a quite new rôle of a helpful, commonsense, practical, alert fellow with a decided soft spot for those to whom a little money means a very great deal.

B

* The proceedings are reported on page 159.

† —assuming the 2½ million houses cost, on the average, £800 each.

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NOTES & TOPICS

THE LOCATION OF INDUSTRY

THERE is a certain irony in the appearance, in these days, of the long-awaited report of the Barlow Commission on the Distribution of the Industrial Population. In wartime, industries and human beings are moved from place to place, and from job to job, with even less consideration of long-term economic and social advantage than in peacetime. Nevertheless, when peace returns the material gathered by the Commission must be one of the bases for constructing a more efficient industrial system.

*

The Commission is unanimous that a new national authority should be established to deal with the question of industrial location; and, among other things, that immediate attention to the problem of the continued drift to London and the Home Counties is needed. It is divided over the nature and powers of the authority which should be set up.

*

Ten of the thirteen members have signed the Majority Report advocating the establishment of a National Industrial Board, but three of them (Sir William Whyte, Professor J. H. Jones and Mr. G. W. Thomson) want the powers of the Board to go very much farther than do the remaining seven. In particular, they argue strongly for a more positive approach—through the creation of more favourable conditions in other parts of the country rather than merely through negative control in the London area.

*

The Minority Report is signed by Professor Abercrombie, Mr. H. H. Elvin of the T.U.C., and Mrs. W. L. Hichens. The minority holds that much of the analysis of the problem by the other ten members does not bring out vigorously enough its urgency, and that their interpretation of the march of history is too complacent. In the view of the minority, the control of industrial location should be put under the charge of a new Ministry, with greater powers than those suggested for the Board by either section of the majority.

*

Both the dissentient groups show a much clearer understanding of the real nature of the problem than do those who sign the majority report without reservation.

*

It is to be hoped that the Commission's failure to present unanimous and concrete proposals will not be taken as constituting a case for no action at all, for at least none of its members is in favour of that course.

THE PROBLEMS OF SUSPENSE

We are coming near the time when we will have to admit that the first dozen bombs to fall in an important British urban area will be a relief.

*

Their arrival will give point to arguments now blunted to uselessness, end the ever increasing contradictions of A.R.P. and Evacuation, and force the country to make up its mind and then stick to it.

*

At present irritation continues to grow; and there is plenty of fuel for it. 2,000 Post Office workers returned to London on the day that 10,000 Civil Servants left. Fifty-nine per cent. of the mothers and babies that were evacuated have now returned. Of the 1½ million school children in evacuation areas at the beginning of the war, less than half were evacuated, and of that half 40 per cent. are now back.

*

Of the twelve evacuation camps of the National Camps Corporation which have been ready for some time, only two are occupied. Nearly a million children are running wild in urban areas.

*

And perhaps the oddest case of all is that of the London Fire Service. The effective strength of this force, making allowance for shorter training and simpler equipment of non-regulars, is about seven times that of the peace time brigade; while it is admitted that *a single raid* could impose on it a strain at least fifty times that of the worst peace time call. Yet between 200 and 400 of the 2,000 regulars of the L.F.B. have been released to rejoin the Navy and other forces, and the full-time A.F.S. are apparently being called up for military service without anyone objecting.

*

The exceptional difficulties of these problems are clear. The greatest of them is without question that of the children. It is inconceivable that a million children should be left without education for two years or more. It is equally plain that only compulsion will get them out of cities and that this compulsion cannot be applied until a comprehensive scheme for education, living accommodation, meals and supervision during free time is ready.

MRS. BORDERS' APPEAL

The famous Mrs. Borders has had her appeal (against the dismissal of her counterclaim in the original action) allowed by the Court of Appeal.

*

The case is complicated, but the essence of Mrs. Borders' counter-claim was that she had been misled into purchasing a house by a brochure issued by the builders which stated that a leading building society was prepared to advance 95 per cent. of the cost over 24 years and "this proved beyond doubt the amazing value of the houses." In fact,

she contended, her house was badly built and the society was itself protected (unknown to her) by a collateral security* agreement with the builder.

*

The Judge, at the first hearing, found that Mrs. Borders was misled by this brochure. But he disallowed her counter-claim on the grounds that the brochure was issued by the builders and she had failed to prove that the building society was responsible for it.

*

The Court of Appeal reversed this decision, holding that Mrs. Borders' taking the house was induced, and the society must have known it was induced, by statements in the brochure which the society knew to be false.

MINISTER FOR SECURITY

In spite of knowing that the opening day is the worst on which to see any exhibition, I was present when Sir John Anderson opened the War Time Lighting and Equipment Exhibition at the Building Centre. My fears were justified ; too many people prevented my seeing the exhibits. But I did see Sir John Anderson using the combined gas mask and telephone receiver which may in time find a place in every home. I reproduce him above.

TIMBER ECONOMY

The amount of timber used by Service departments in the building contracts placed by them during the first months of the war was considered excessive and unwise by most of the building industry.

*

In an interview last week Major A. I. Harris, the Timber Controller, stated that timber for general housing (as opposed to munition workers' housing) is unlikely to be available during the war ; and furniture manufacturers will be restricted to expensive hardwoods.

Timber imports must be cut down, as we all realize, but the industry would consent to this grave restriction more cheerfully if it had not seen timber lavishly used by Government works where home-produced materials would have done at least equally well.

*

It is comforting that the army is also going to economise henceforward. The wood used in ammunition boxes is to be reduced, and tent-poles and broom-handles are going to be square instead of round ; round handles, being turned, require a larger section of wood.

*

One might add, before our brave soldiers have the chance of doing so in their own boyish way, that broom handles are likely to be bashed. A bashed edge raises splinters very easily, and a square broom handle—being almost impossible to hold anyway—will become quite poignant when splinters are added to it. That is why broom-handles have been hitherto made *round*.

NEWS FROM THE CUTTINGS

The tower of Liverpool Cathedral is now 13 feet higher than it was this time last year, and it is hoped that during 1940 it will rise at least another ten feet.

*

Brighton has spent £100,000 on A.R.P. services which include a decontamination laundry—" the only one of its kind on the Sussex littoral."

*

Following the disapproval by the Ministry of Health of the Wirral Town Planning Scheme, the Wirral Joint Town Planning Committee is to be disbanded.

*

Architect Anthony Hodge of Saddleworth, addressing last week a " Be Bright " meeting at Waterhead Parish Church, summed up by saying that " art was the external contemplation of the human soul." For the next " Be Bright " meeting a Tongue-twister Bee has been arranged.

PROBLEM CORNER

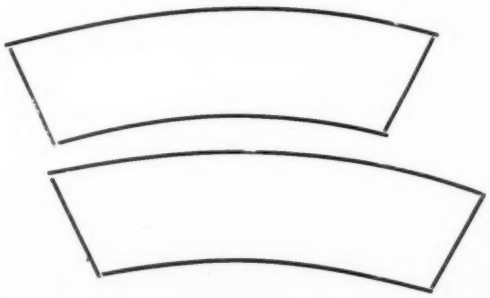
I have received this letter :

February 2

One of our assistants, who happened to be using a planimeter at the time, was curious enough to run the instrument round the two figures reproduced in your notes this week.

He informs us that the superficial area of each is the same, i.e. 1½ square inches. The problem, therefore, need trouble you no longer.

I reproduce the figures again below.



ASTRAGAL

* The principle of collateral security is explained on the previous page.

★ *Although the war goes on, the first state of emergency, as far as the* JOURNAL *and architects are concerned, may be said to have passed. It is no longer necessary for architects to find their way to the right new Ministry in twenty-four hours and to do the drawings after the work is finished.*

This return to something like orderliness is celebrated in these pages by a return to something more like the pre-war arrangement of our contents.

In future, News and Letters will follow Astragal's Notes, and be succeeded by current buildings. But the Information Centre (pages 169–174), though it has changed its position, will remain ready to answer any question and its "Current Problem" articles to deal with all important war-time developments.

NEWS

●

General

A.R.P. HANDBOOK

Following correction has been made to A.R.P. Handbook No. 5A :

BOMB-RESISTING SHELTERS

Paragraph 15 (e) :

For

"The topmost layer of reinforcement shall consist of ¾-inch bars at 12-inch centres laid horizontally in both directions, 8 inches below the upper surface of the base."

Read

"The two topmost layers of reinforcement shall consist of ¾-inch bars laid horizontally at 12-inch centres in each direction; these layers being respectively 2 inches and 8 inches below the upper surface of the base."

LIVERPOOL CATHEDRAL

During last year 13 ft. were added to the height of the tower of Liverpool Cathedral, which is now 296' ft. above street level. Work on this and other sections of the Cathedral, though slowed down, is continuing. Cathedral committee reports that sufficient stone has been finished to build the next 10 ft. of the tower, and stone for 5 ft. more is being worked.

MANCHESTER SOCIETY OF ARCHITECTS

Mr. E. Stanley Hall, P.R.I.B.A., was the chief guest at a recent luncheon of the above Society. He said :

"We architects are not only willing but anxious to play our part in the nation's gigantic struggle. We know that we have our own definite contribution to make and we are hurt that the powers that be have hitherto brushed us aside and failed to recognize and use the special technical abilities that we claim to possess. We have been politely told to run away and play. We have been told that there is no 'architecture' in huts or factories or encampments and that such works are far better left in the hands of people who, for all their knowledge of the accommodation required, have no idea whatever of the problems of planning, and little realization of the importance of the right correlation of the parts into an ordered whole, until the buildings are erected and the faults cry out."

Was it not planning, Mr. Hall asked, that was the essential requirement in all the vast schemes now being carried out? Without that work might be misconceived, time wasted, labour and materials wrongly used. No general would launch his troops into battle without a plan, but many generals seemed to be embarking on vast encampment schemes before the plan had been worked out or the operation orders had been fully developed.

A.R.P. INSTITUTE

Paper entitled "Design and Installation of Services in Shelters" to be read by Mr. Norman Forster at general meeting of Institute on February 13 (8 p.m.) at Royal Society of Arts, John Street, W.C.2.

I.A.A.S.

Council of the Association, at its last meeting, re-elected Mr. J. E. Swindlehurst, M.A., F.I.A.S., as President for the ensuing year. Sir Charles Allom was elected Chairman of Council and Mr. V. S. Peel, F.I.A.A., of Birmingham, as Vice-Chairman of Council.

A.R.P. EXHIBITION

An exhibition in connection with A.R.P. lighting for shops, industrial and domestic premises, shelter lighting, heating, ventilation, etc., was opened at the Building Centre, 158 New Bond Street, W.1, on Friday last by Sir John Anderson. The exhibition is being held under the auspices of the British Electrical Development Association. Sir John Anderson said :

The exhibition was designed to show what electricity could do to meet the new problems which war-time lighting restrictions had produced. Ideal black-out would be no lights at all. But that would mean no production—almost no life—after dark. The aim, therefore, should be to have such obscured or controlled light as would enable essential activities to be carried on, but would not show a pattern to raiding aircraft. Within the limits of regulations people should allow themselves as much light as they could, and by taking pains, they could have quite a reasonable amount of light within the limitations of the black-out policy Those in control of lighting should make sure that they were taking every permissible advantage of new devices which the ingenuity of experts had put at their disposal.

He expressed gratitude to the electrical industry for their co-operation in tackling the difficult problems of the black-out. It was hard for a lighting engineer to go against all his natural instincts and to bend his energies to devising means of creating less and less light, but the whole industry had been ready to adapt itself to war conditions.

THE ARCHITECTURE CLUB

A meeting of the Architecture Club is to be held at the Building Centre in connection with the A.R.P. Exhibition on February 14, at 4.30 p.m. to 6.30 p.m., when arrangements are being made for the exhibition to be fully explained to members of the club. Refreshments will be provided.

HOUSING CENTRE

Tuesday lunches (1 p.m.). 13th : "Amenities and the Accommodation of H.M. Forces," by Major T. Jackson ; 20th : "Housing and the Journey to Work," by Miss Käthe Liepmann ; 27th : "Nursery School Children in War-time," by Miss T. Marriott, Secretary, Nursery School Association.

Exhibition reception (4 p.m.), Wednesday, February 21, "The Homes they come from." Speaker : The Rt. Hon. Margaret Bondfield, M.P., J.P., LL.D.

HOUSING AS A POST-WAR PROBLEM

"Problems of Social Environment and the War" formed the subject of a conference organized by the Housing Centre, and held last Friday at the R.I.B.A. It lasted throughout the day, and the subjects discussed were Education, Industry, Housing, Health and Recreation. The morning session was presided over by Lord Balfour of Burleigh, and that of the afternoon by Lord Horder.

The following resolution was passed : "This Conference, believing that the welfare of the people depends on sound environment for the individual, is resolved that a Council should be established of not less than thirty members who, either as individuals or as representatives of organizations, are interested in the relevant problems, and that the immediate objective of this Council shall be to promote, through research groups and by other means, the planning of social environment on a national scale and to make widely known the need for such planning." A Council was elected.

The discussion on Housing was to have been opened by Mr. R. A. H. Livett, A.R.I.B.A., Housing Director of the City of Leeds. In his absence it was opened by Mr. Kenyon, representing the Architectural Association.

Mr. Kenyon said he would like to consider housing in the broadest sense, as meaning houses for all types of people, and his first point dealt with the speculative builder. A large proportion of people desired to purchase their own houses, and the majority of the houses built to meet this need had in the past been provided by the speculative builder. In some cases very creditable achievements had been accomplished, but much more often this was not the case. The blame for this should not be placed entirely at the door of the speculative builder, as no one else had taken the trouble to supply this enormous demand. He had been allowed to buy land wherever he wanted, even along new arterial roads, and his plans and designs had been

INDEX

The Index to the contents of THE ARCHITECTS' JOURNAL for the half-year, Volume No. 90, July to December, 1939, is now ready. Subscribers may obtain a copy upon application to :—

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approved by the elected representatives of local government. The result had been ribbon development, houses built closely together on main roads and the sterilization of back land. Here was a problem requiring very serious consideration and research. The speculative builder had closely studied the requirements of his clients. Why, for instance, did he build his houses on a road frontage? Because he knew that people would buy houses on a busy road rather than in a quiet cul-de-sac or quadrangle. People liked to live where they could see some activity going on outside. Thus the site planning of houses was itself a problem.

The speculative builder knew that single houses would sell more readily than those semi-detached if people had the money to buy them, and he also knew that he could not easily sell houses built in blocks of three or four. Architects realized the difficulty of good street architecture with small houses built detached or in pairs: here therefore was an opportunity for co-operation with the speculative builder who had taken over this type of property and would welcome the opportunity of planning with those interested. In the past this problem had been left alone because architects had been overwhelmed by the enormity of the task, but now there was a lull there seemed to be an opportunity.

The effect of evacuation on living might play a large part in the future housing of the population. Many businesses which had thought it essential to have offices in London and large towns had found it cheaper and better to carry on in the country with employees nearer their work. It might not be possible during the war to ascertain correctly the feelings of employees, because these were probably living away from home under less pleasing conditions than those to which they were accustomed, but it might well be that, given sports and other facilities, employees would prefer to live in the country near their work. We all knew of firms who had built towns in the country: others had grounds for sports clubs, etc., in the country but had not built a town. Such a firm, or a group of them, might build a village with transport, schools and other facilities, and investigation could be made now as to how evacuation was working.

Lastly came the question of the housing of the lower-paid workers. Looking back over twenty years it could safely be said that the type of house which had had most thought given to it was that for the working class. Great strides had been made in abolishing slums and making the new homes better in every way; but in our efforts to do this had we paused to consider sufficiently whether these working-class people preferred to be housed in large blocks of flats, or would they prefer small houses? It might be that blocks of flats would be the future solution of all housing difficulties, but before deciding what was right or wrong we should take a census from the people concerned.

Miss Denby referred again to the problem of flats and cottages, asking, Why not both? It seemed to her you could divide human beings into two main groups irrespective of income or class. Had they a family or not? A family group wanted its own little house, its own little garden and so on, whatever the income. But unmarried or childless people would probably live much better in a flat.

Mr. Breeze (Secretary of the Guinness Trust), speaking on the subject of flats or houses, said that time and again he had discussed this question at conferences, and he had had it out with many of his own tenants. The workers preferred to live near their work. He knew this from applications he got from people who worked in Bermondsey, who had to work at all hours night and day, and were obliged to live, literally, where they could hear something coming up the river so as to have the chance of a job of work. Only two years ago the Trust had moved a number of such people to a fine modern estate at Brixton, and he had had any number of applications from Bermondsey families who wished to move back because Brixton was too far from their work.

Building

HOUSING IN SCOTLAND

Building work to be done for Service Departments and for A.R.P. and Civil Defence programmes and for local authorities might help to keep the building industry occupied at least to a useful extent for some time. This hope was expressed by Mr. John Colville, M.P., Secretary of State for Scotland, to a deputation from the National Federation of Building Trades Operatives who met him in St. Andrew's House, Edinburgh, last week.

Deputation expressed its concern at increase in unemployment in building trade, and asked the assistance of Secretary of State in securing employment for its unemployed operatives. Deputation also urged upon Mr. Colville necessity of getting houses now standing incomplete finished as speedily as possible.

In reply, Mr. Colville said he was anxious to see improvement in housing conditions in Scotland, but because it was necessary to utilize to best advantage supplies of certain materials—also used in house-building—there were many difficulties to be overcome. He pointed out that despite these drawbacks the Government had made it possible for local authorities to complete those houses which were begun at the beginning of September as soon as material became available. Number of houses in that category in Scotland was 29,000, and 7,000 had already been finished. In addition, permits for timber required to complete a further 12,000 had been issued.

Deputation expressed agreement with Secretary of State's view that the most effective use of the country's financial resources to further the country's war aims was of paramount importance. This was another factor which had an important bearing on the housing situation.

Mr. Colville went on to point out that the question of employment in the building industry in war-time did not affect his Departments alone. Ministers of Labour and Supply and the Chancellor of the Exchequer were also interested in the questions of policy in connection with the economic situation generally and in relation to the war effort. For himself, he assured the deputation that he was fully alive to the importance of the building industry for the nation's war-time and post-war requirements. It could be certain that the subject of employment in the industry was one that the Government kept under continuous review.

TIMBER CONTROL

Minister of Supply has made the Control of Timber (No. 8) Order, 1940*, which covers supplementary schedules of maximum prices for imported softwood, imported pitwood, and plywood. New schedules do not involve any increase in prices, but make provision for maximum prices for items not shown in previous Timber Control Orders.

Softwood and hardwood importers and merchants and plywood importers, situate in the United Kingdom, should now apply to the Area Offices of the Timber Control for copies of Form T.C.3/8/Q1, "Application for Trading Quota to deal in 'National Stock' of timber." The application forms, when completed, are to be returned, marked "Confidential," to the Ministry of Supply, Timber Control Department III, Branch 8, Bristol. Only applications in writing will be considered. Members of the timber trade are advised to apply promptly for the form so as to give them sufficient time to prepare the necessary information required to complete it. Only applications from importers and merchants will be considered.

IRON AND STEEL

Minister of Supply has made the Control of Iron and Steel (No. 6) Order.* This Order, which came into force on February 1, 1940, supersedes the Control of Iron and Steel (No. 4) Order, 1939.

In substance the previous Order remains unaltered, but attention is drawn to the narrower scope of the exemptions from licence contained in Direction (No. 1) attached to the Order.

The maximum prices fixed under the Order represent in the main an addition of 3s. per ton in the case of pig-iron and £1 per ton in the case of semi-finished and heavy steel products with corresponding adjustments in the prices of finished products. These additions, as in the case of the additions made on November 1, 1939, are for the purpose of meeting from a Central Fund the additional costs, including higher freight charges, which arise from importations of raw and semi-finished materials under war conditions.

There are also some further adjustments in the prices of tinplates and iron castings.

B.I.N.C.

Building Industries National Council has issued for publication, in its series of National Codes of Practice, a code for the use of reinforced concrete in the construction of buildings.

Code is intended for the use of designers and specifiers and should prove of service to officials of Government and Local Authorities concerned with this type of structure. National Council has set up machinery which will enable terms of this Code to be revised from time to time so as to keep practice in consonance with structural developments and research.

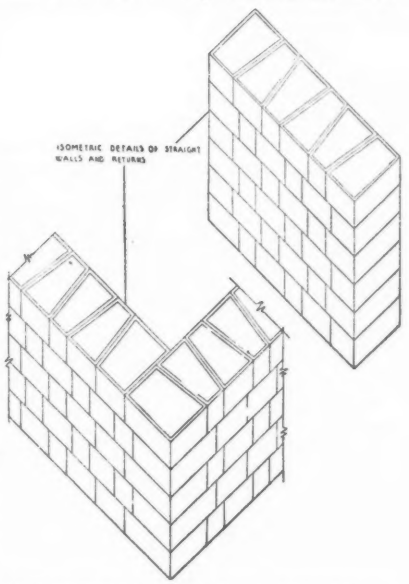
Code sets out principles to be followed with regard to loading: the use of materials and craftsmanship: permissible stress: design: party walls; together with a series of schedules dealing with standard methods of tests of various kinds.

Price of Code is 1s. 3d. post free, and it is obtainable direct from the Offices of the Council.

* *Copies may be obtained directly, or through any bookseller, from H.M. Stationery Office.*

MANUFACTURERS

BELL & CO. have just issued details of their precast reinforced concrete sand boxes for permanent replacement of sandbags.



Firm state: The sand from disintegrated sandbags is utilized to fill the concrete boxes; consequently, the expense of carting sand away is obviated. The boxes build up loosely with bonded joints but, if desired, each box can be clamped to its neighbour by means of bolts, nuts and washers introduced through holes in either side of the box. The area of each box is approximately equal to two-and-a-half regulation-size filled sandbags. Special boxes for right angle, stop or return ends are supplied at 50 per cent. extra to the price of the standard box. Precast concrete lids can be supplied for top courses. The boxes are practically indestructible, permanent, and have a reasonable post-war value as garden boxes. Weight, approximately 100 lb. each (unfilled). Outside sizes, 9 in. by 24 in. by 15 in. Height, 10 in. Thickness, 1 in.

Comparison of cost of sandbags of four months' life, with concrete boxes, over a period of twelve months:

Quantity	Concrete boxes (excluding sand)		Sandbags, filled at 8d. each
120	£22 10 0	Plus	£30 0 0
250	£43 15 0	delivery	£62 10 0
500	£81 5 0	charges	£125 0 0

HOLOPHANE. Latest folder deals with new Holophane 302 A.R.P. low intensity street lighting.

This folder includes the full details of the Holophane patented design and also shows on the back page the three most common adaptations for the use of the A.R.P. lanterns in existing street lighting equipment. The British Standard Certificate has now been received for the Holophane 302/20 street lighting units, which are now in production.

PILKINGTONS. Glass bricks and lenses of certain specifications may now be used in air raid shelters without the use of shutters or screen walls. Following notes have been issued by the firm:

Authorization of this is contained in a letter from the Home Office Air Raid Precautions Department to Pilkington Brothers. It is conditional upon the openings being over 6 ft. above floor-level. Previously, by the terms of the Revised Code dealing with the designing of shelters for

factory and office employees, such openings as were authorized had to be protected either by timber shutters 2 in. thick or mild steel $\frac{1}{16}$ in. thick or by a screening wall.

Glass bricks and certain types of lenses were tested at Shoeburyness recently to ascertain their resistance to blast from a 500-lb. bomb exploding at 50 ft. Very little damage was done, and the high resistance to blast of this and certain other types of glass was officially mentioned in A.R.P. Handbook No. 5.

Owing to the method of fixing the bricks and lenses, the openings will be completely sealed and rendered gas-proof.

The authorization to use glass masonry and lenses does not imply any approval of the use of glass as an alternative material for either lateral or overhead protection required by paragraph 2 of the Revised Code.

The approved specifications are as follows :—

1. GLASS MASONRY

Description of Glass Bricks.—Total thickness must be at least $3\frac{1}{4}$ in., manufactured in two halves and sealed together. Face dimensions must not exceed 8 in. by 8 in. The surfaces can be smoothed or ribbed. No brick should weigh less than $3\frac{1}{2}$ lb.

Size of Glass Panels.—The panel of glass bricks must be limited in size so that its superficial area does not exceed 14 sup. ft. and so that it has no dimension exceeding 4 ft.

Method of Fixing Panels into Walls.—The top and sides of the glass panels must be built into recesses in the walls, with clearances to allow free movement (to avoid risks from settlement, loading and expansion strains). The recesses must be at least 1 in. deep, allowing at least $\frac{1}{2}$ in. clearance and at least $\frac{1}{2}$ in. cover over the face of the glass; they must be about $\frac{3}{4}$ in. wider than the thickness of the glass panel; and the top and sides of the panel must be pointed with a non-hardening composition.

Construction of Panels.—Before the glass bricks are laid the cill must first be coated with an asphalt emulsion (to allow slight movement without disturbance). The bottom course should then be bedded on the cill in cement mortar. A fairly dry and fatty mortar should be used. A suitable mix is 4 parts (by volume) sand, 1 part Portland cement and 1 part slaked lime putty, mixed fairly dry. Reinforcement strips should be built in every third course. The ends should pass through the clearance joints and be built into or secured to the main structure. "Exmet" $2\frac{1}{2}$ in. wide No. 20 gauge expanded metal, or similar, is suitable for this purpose.

2. TOUGHENED GLASS LENSES

Description of Lenses.—The lenses must be of toughened glass, equal in quality to Pilkington's 'Armourlight,' specially manufactured to be resistant to impact, and designed for fixing into concrete, of sizes not less than 2 in. thick and not exceeding the following dimensions :

$4\frac{1}{2}$ in. by $4\frac{1}{2}$ in. ... For lenses at least 2 in. thick.
6 in. by 6 in. or 7 in. dia. } ... For lenses at least $2\frac{3}{4}$ in. thick.

Method of Fixing.—The lenses must be built into pre-cast reinforced concrete slabs, not less than 5 in. thick, with not more than one lens per sq. ft. of panel. The window opening should be rebated to fit the panel, and the panel must be well secured to the adjoining masonry or brickwork by metal anchors or other means.

3. SOLID GLASS LENSES

Description of Lenses.—The lenses must be of solid glass, equal in quality to Pilkington's "Nevada" glass lenses, not less than $1\frac{1}{2}$ in. thick and not larger than 8 in. by 8 in. in size.

Method of Fixing.—As for toughened glass lenses above.

LETTERS

Livelihood Census—1940

SIR,—Astragal's policeman story has recalled to mind the architecturally trained policeman of my own home town, and also the fate of ever so many surplus pupils, now obtaining a living in other spheres of industry.

Why not a census and register of those? It would show the need for control of the numbers of entrants to this so far overcrowded occupation.

There is much sniffpecking over the fate of masters of pupil factories having to follow these unfortunate pupils into professional exile.

Let them console themselves that their chances of other employment are far better now than were those of the disillusioned students of the past. For the unconsolable, the worst building of the last decade might be reserved as a wailing wall.

HUGH DAVIES

COLLAPSE OF STRUCTURES

Below is a Note on the resistance to Collapse of Structures under air attack by Professor J. F. Baker, M.A., Sc.D., D.Sc., ASSOC.M.INST.C.E., M.I.STRUCT.E., of the Research and Experiments Branch, Ministry of Home Security, A.R.P. Dept.

1. INTRODUCTION

The necessity of ensuring that the buildings in factories are as resistant as possible to collapse, when subjected to air attack, should need no stressing. While a direct hit on a factory can scarcely fail, by destroying plant or stores, to interfere to some extent with production, the damage will be much more widespread and costly if, at the same time, a main member is weakened and leads, as is possible, to the collapse of a large area of the structure.

Thanks to the somewhat conservative values of working stresses hitherto assumed in design in Great Britain, the great majority of modern buildings, though designed without any thought of attack from the air, will be comparatively resistant to collapse even when subjected to serious structural damage. Certain types could, however, be made much more resistant by slight amendments in design and detail which would not increase the weight of the structure appreciably.

No attempt is made in this Note to deal with particular problems, but the attention of the designer is drawn to general points which he should consider when designing new structures, or when strengthening existing buildings.

The structures discussed fall into four main classes :

(*a*) Fully-framed, steel or reinforced concrete, multi-storey buildings.

(*b*) Single-storey modern steel factory buildings.

(*c*) Older buildings, often partly framed and partly wall-bearing.

(*d*) Special types, such as erection sheds, with very long spans.

2. FULLY-FRAMED MULTI-STOREY BUILDINGS

(*a*) Fully-framed steel or reinforced concrete buildings are comparatively resistant to collapse, since they are capable of adjusting themselves to heavy overloads for which they were not specifically designed.

(*b*) A near hit is unlikely to damage the main frame seriously. It may demolish panel walls. These may fall inwards and produce a debris load which may cause collapse of an already heavily loaded floor. Such a collapse will not be produced if the actual floor load carried is, as is often the case, considerably less than that for which the floor was designed. For instance, it has been possible to suggest, when dealing with basement shelters, that no strengthening of a framed building, steel or concrete, is needed :

(i) Where the actual load carried does not exceed 25 per cent. of the superimposed load for which the floor was designed ; and

(ii) Provided that the floor was designed for a load of at least 80 lb. per sq. ft.

In a factory the actual load may often exceed 25 per cent. of the design load, but that design load may greatly exceed 80 lb. per sq. ft. Where this is so, the percentage can be increased above 25 per cent. As a rough guide it may be laid down that where a heavy machine rests on a floor panel and imposes on that panel a load approximately equal to the design load, the structure below that floor panel should be strengthened. The structure can be most economically strengthened, where space is available, by propping main beams and floor slabs. In the case of reinforced concrete frames some care must be exercised in this propping, a knowledge of the position of the reinforcement being necessary, but the danger from high shear stresses at the prop is not so acute as is usually supposed. Tests are being carried out on the strength of propped reinforced concrete beams and more definite recommendations will be available in the near future.

(*c*) Where a direct hit may wreck one bay of one floor, or more, complete collapse of a large part of the building is unlikely to follow even if some main members are cut. Debris is liable to fall in other bays, however, and to reduce the structural damage, strutting as described in (*b*) should be considered in inside bays, even though no panel walls can fall on them.

(*d*) The resistance to collapse of framed buildings is due to the continuity in these structures, which is of a high order even in a steel frame with the usual, comparatively light, cleated connections. It may be said that wherever continuity can be introduced, it is desirable. For instance, in many factories there are gallery structures, carrying machines, the beams being supported on steel stanchions. The beams are not usually continuous over the stanchions, but are connected into them or joined over them, as a rule by web plates. If these connections were made to develop the whole strength of the beam, by welding or otherwise, resistance to collapse would be greatly increased, since, in many cases where this provision is made, complete failure of the beam would not follow even if a stanchion were cut.

3. SINGLE-STOREY MODERN STEEL FACTORY BUILDINGS

(*a*) This very common type consists of lines of stanchions carrying roof girders—joist beams in small shops and heavy trusses in larger structures—on which the roof trusses rest.

(*b*) This type is not particularly vulnerable, but if an internal stanchion is cut the girders on either side will collapse, and may often involve an area of roof 100 ft. by 50 ft. or more. In many cases a hit from a large splinter would cripple a roof girder and might bring down the roof trusses supported on it.

(*c*) These structures could be made much more resistant to collapse. In new construction this would involve little or no additional expense. In existing shops the alterations needed would depend on the details of the structure, but it should, in most cases, be possible to do a great deal at no great expense. Such work may necessitate the use of unorthodox joints.

(*d*) It must be remembered that these structures are designed to support the dead load of the roof, with wind loads and snow loads in addition, without a certain permissible stress, far below the yield stress of the material being exceeded. What should be required of them, in addition, is the capacity of supporting the dead load of the roof only when any one stanchion or any one main roof girder is cut by a direct hit. In this condition the usual permissible stresses can be safely exceeded. The simplified methods of calculation, used generally in design, are not well suited for the determination of the capacity of the structure to stand when damaged. An examination of the real strength of the structure must be made. It should be remembered, for instance, that failure does not necessarily take place when the yield stress of the material is developed at one section. It is probable that in many cases no increase in the weight of material in the main structure will be needed to ensure that collapse does not take place when one member is cut. Details, such as the connections from beam to stanchion, will, however, need revision, and the most economical method will probably be to make the beams or trusses continuous over the stanchions.

(*e*) It has been stressed above that continuity is most desirable in structures which may have to resist air bombardment. The most efficient type is the rigidly-jointed frame or portal. The joints, in steelwork, can be made by riveting, bolting or welding. Attention should be paid to the possibility of using this form of frame construction. Many structural engineers have had no experience of this form and may be under

the impression that it is difficult to design. Advances have, however, been made in recent months and there are firms in the country capable of designing and fabricating portal frames quickly. Where heavy brick panel walls are demanded, as in certain vital buildings, their weight can be transferred to the bases of the stanchions, so making it possible to design the portals as fixed-ended. This leads to a considerable economy of steel. These portals can now be designed as quickly as any more orthodox structure.

4. OLDER BUILDINGS

(*a*) Many older buildings, multi-storey and single-storey, though having steel beams and internal stanchions, have the ends of the beams or trusses carried on load-bearing walls. In these cases a direct hit on such a wall would have disastrous effects.

Additional resistance to collapse can be given by the provision of stanchions to support the beams if the wall is damaged. The best position for these stanchions depends on the distribution of any heavy loads on the floors and, of course, on the space available. In general, the best position is not in contact with the wall.

(*b*) Similar features to that mentioned in (*a*) are sometimes found in other types of buildings. For instance, in one works inspected, a shop mainly of reinforced concrete frame construction was spanned by long steel joists supporting the roof trusses, the ends of the joists being simply supported on haunches formed on the reinforced concrete columns. This is clearly objectionable, as a near hit would displace the ends of the joists with disastrous results. In such a case the joists should be so restrained that they could not move laterally relative to the stanchions.

(*c*) There are many older types of building which are not satisfactory and which do not lend themselves readily to improvement. In general, as reiterated above, the best steps to be taken are to provide as much continuity and bracing as possible in the load-bearing part of the structure.

5. SPECIAL TYPES

(*a*) Where there are excessively long span trusses supporting a roof, as in an erection shed, additional props may be needed owing to the danger of existing stanchions being hit or a joint or member in the truss being cut by a direct hit.

(*b*) The principle of continuity explained above should be used as a guide in designing the propping system. Here again the object is to prevent complete collapse. Local over-strain in members is not seriously objectionable, so that it may not be necessary to insert props under every panel point. Strengthening of joints and additional counterbalancing may further reduce the number of props required.

The greatest care must be taken to secure economy in this work. The structural designer, whose concern it has always been in the past to produce a structure with an adequate factor of safety, will probably not find it easy to consider with equanimity one on the point of collapse. There may well, therefore, be a tendency to over-strengthen the structure.

(*c*) Additional props and strengthening of the truss as suggested in (*b*) above appear to be preferable to the sand-bagging of existing members.

LAW REPORT

BUILDING SOCIETY *v.* BORDERS

Below is a Report (reproduced by permission of "The Times") of the case of Bradford Third Equitable Benefit Building Society v. *Borders in the Court of Appeal.*

THE Court allowed this appeal by the defendant, Mrs. Elsy Florence Eva Borders, of Kingsway, West Wickham, Kent, from the decision of Mr. Justice Bennett (reported in *The Times* of February 14, 1939, and 55 *The Times* L.R. 440), dismissing an action by the Bradford Third Equitable Benefit Building Society for possession of her house under a mortgage deed dated October 10, 1934, on the ground that subscriptions due under that deed were more than three months in arrear and dismissing a counterclaim by Mrs. Borders for damages for fraudulent misrepresentation.

The plaintiffs lent the defendant £693, taking from her a mortgage of the house. The normal amount which they would have advanced on the property, which had been valued at £730, was £545. They advanced £693 because, in addition to the mortgage, they had a collateral agreement from the builders on a fund provided by the builders, Messrs. Morrell (Builders), Limited, to secure loans by the plaintiffs to the defendant and other persons who bought houses from the builders. That agreement was made on March 3, 1934, and on October 17, 1934, a pooling agreement was made between the builders and the society under which the sum of £37 (which related to the sum advanced to the defendant) with 49 other sums deducted from sums supposed to have been advanced by the society to 49 other borrowers made a collateral security provided by the builders to the defendant and any other borrowers.

Mrs. Borders denied that her payments were in arrear, and made a counterclaim for damages, alleging that she was wilfully and fraudulently misled by the society into the belief that the house was a good security for the money advanced.

By her defence and counterclaim Mrs. Borders challenged the validity of the mortgage deed. She contended that as the society took for security for the money advanced, not merely a charge on the house, but also a charge on money deposited with them by the builders from whom she bought the house, that was a transaction outside the powers of the society as prescribed by their rules and by the Building Societies Act.

It was submitted on behalf of the society that Mrs. Borders could not succeed in her contention that the transaction was *ultra vires*, as no borrower was entitled to say that the lender had no authority to lend the money. It was further said that the society were entitled to fortify their freehold or leasehold security by collateral security.

Mr. Justice Bennett said that the defendant set up a number of defences. The first was that the deed sued on (referred to as D 5) was not signed by her or her husband, though they admitted that they had signed a mortgage deed. On the evidence he thought that the plaintiffs had failed to discharge the burden of proving that the deed was executed by the defendant or her husband. It followed that the plaintiffs' claim must fail, and it was strictly unnecessary to express an opinion on other defences set up. It might, however, be of assistance to the Court of Appeal if he expressed his opinion on this. For the purpose of dealing with those other matters he would treat the mortgage deed as validly executed. If that were the case the defendant alleged that it was executed in escrow, and was not to be put into force until certain work had been done on the house. She had proved that the condition had not been fulfilled but the plaintiffs alleged that she was estopped from relying on the non-performance. There was no sufficient evidence to establish an estoppel. Alternatively the plaintiffs said that the defendant had approbated the argument, but he could not see that there was any act of approbation.

The defendant also alleged that what the plaintiffs had done was *ultra vires* and unenforceable by them, because they had taken a collateral security from the defendant's builders. In his judgment the directors had broken a rule of the society, but that would not invalidate the transaction, because the rules were narrower than the law as set out in section 13 of the Building Societies Act, 1874.

In regard to the defendant's counterclaim for damages for fraudulent misrepresentation alleging that she was told that the house was erected in accordance with the by-laws, that it had been inspected in course of erection, and that it was built of exceptionally good materials and by good workmen, she proved that the house was damp, that the builders failed to comply with the local by-laws, that the roof was badly constructed, that the foundations were insufficient, and that the builders had adopted deceptive means to conceal the deficiencies. The defendant had satisfied him that it was on the faith of these misrepresentations that she had bought the house. She had, however, failed to prove that the plaintiffs were responsible for the statements which had been made, and her counterclaim must, therefore, fail.

The defendant appealed.

Mr. Comyns Carr, K.C., and Mr. Charles Lewes appeared for the appellant; Mr. Roxburgh, K.C., and Mr. M. G. Hewins for the respondents.

By the notice of appeal the appellant asked to have the order dismissing the counterclaim with costs set aside and (*a*) that it might be ordered and declared that the house in question was not mortgaged or charged in any way to the plaintiffs; (*b*) that the plaintiffs might be restrained from making any advances otherwise than on the security of freehold and leasehold property or from advancing more than the sum for which in the opinion of the directors of the society the premises were sufficient security. They also asked for repayment of £121 16s. paid to the plaintiffs in purported repayment of the mortgage and for £500 damages for fraudulent misrepresentation.

In the course of the hearing the defendant put in an amendment to her counterclaim claiming that the plaintiffs had falsely and fraudulently represented to the defendant in a brochure issued by the builders to the defendant with the authority of the plaintiffs and relating to houses on the Coney Hall Estate and in particular to the house erected on plot 187 a large number of matters relating to the alleged high quality of the buildings; that a leading building society (meaning the plaintiffs) made a more generous advance over a longer period (95 per cent. of the purchase price over a period of 24 years) than to any other estate in Great Britain, and that this fact spoke volumes for the construction of the houses; and the defendant claimed that she had been thereby induced to enter into contracts for the purchase of the plot and for the erection of the house and garage and to authorize Morrell's on September 18, 1934, to obtain from the plaintiffs an advance of £693 on the security of the conveyance of the premises.

Judgment

Lord Justice Clauson, delivering the judgment of the Court, said that the brochure contained the following paragraph: "Morrell (Builders) Limited are the only builders who can offer, by special arrangement with a leading Building Society, a 95 per cent. mortgage advance over a period of 24 years at 5 per cent. interest. This proves without a shadow of doubt the amazing value of Morrell's houses." The learned Judge found with complete justification that this passage led the defendant to believe that the house was exceptionally well built, that this representation was false and Morrell's knew it to be false. It also meant that the value of the house was such that by itself it afforded a security which would be accepted by a prudent lender, namely, the building society, for a loan equal to 95 per cent. of the purchase price asked and that accordingly the house was worth at least the purchase price asked.

The defendant had contended that assuming

the mortgage to be otherwise an effective document the transaction was invalid because the advance was made on a composite security consisting of the mortgage of the house supported by way of collateral security by a charge given by Morrell's on a personalty fund provided with a view to securing the plaintiffs against losses on advances made to purchasers from Morrell's. Mr. Justice Bennett held that the mortgage could not have been treated as invalid on the ground of its being *ultra vires*. His decision was held to be correct in Halifax Building Society *v.* Salisbury (56 *The Times* L.R.211). It was sought in the present case to set up the point that on the true construction of the rules of the plaintiffs it was a condition precedent to any advance being made by them that the directors should *bona-fide* form an opinion that the real property mortgaged was, apart from any collateral security, a sufficient security for the advance. But the relevant rules in Halifax Building Society *v.* Salisbury (*supra*) were the same in all material respects as those of the plaintiffs, and the Court of Appeal decided in that case that the advance was not *ultra vires*.

The defendant's counterclaim for the return of £121 16s. representing payments made by her to the plaintiffs towards repayment of the advances had to be considered in connection with her counterclaim for damages for fraud based (*inter alia*) on the representations in the brochure. Had rescission been successfully claimed there might have been some scope for an order for repayment of this specific sum. But ultimately, on the pleadings as amended, the sum was claimed as an item relevant to the question of damage.

The claim for damages was based on various alleged fraudulent misrepresentations, the most important being that contained in the brochure. There was every element present in the case which would enable the Judge to hold the plaintiffs liable in damages if one further element were present—namely, evidence that the representations, and, in particular, the representations quoted from the brochure, were put forward to the plaintiffs' knowledge for the purpose of inducing the defendant to enter into a transaction with Morrell's which would lead to a consequential transaction between the defendant and themselves. The Judge considered himself unable to find for the defendant on this part of the case.

His Lordship considered the evidence and said that the defendant's action in becoming a party to the advance was induced, and the plaintiffs must have known that it was induced, by the misrepresentations in the brochure which the plaintiffs knew to be false. The facts before the Court were not inconsistent with the personal honesty of the directors individually, but in this matter the society's business was conducted fraudulently and the society must be visited with the consequences of the fraud.

There should be inquiries as follows: (1) What sum is at the date of the certificate due to the plaintiffs by the defendant on the footing that she became on October 10, 1934, indebted to the plaintiffs in a sum of £693 repayable with interest at 5 per cent. per annum and that she has since repaid to the plaintiffs on account of that indebtedness £121 16s.: (2) what was the true value on October 10, 1934, of the land with the buildings thereon: (3) what sum would at the date of the certificate be due from the defendant to the plaintiffs on the footing that she became on October 10, 1934, indebted to the plaintiffs in a sum less by £34 of that true value, repayable with interest at 5 per cent. per annum, and that she had since repaid to them on account of that indebtedness £121 16s. The plaintiffs should be ordered to pay the defendant by way of damages for fraud the amount by which the sum found in answer to the first inquiry exceeded that found in answer to the third.

Solicitors.—Messrs. Boustred and Sons, for J. Eaton & Co., Bradford: W. H. Thompson.

DOULTON'S OFFICES AND

DESIGNED BY

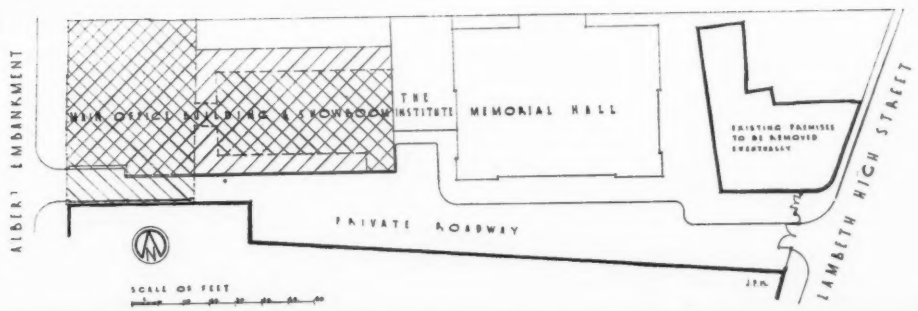
Office Building: front to Albert Embankment

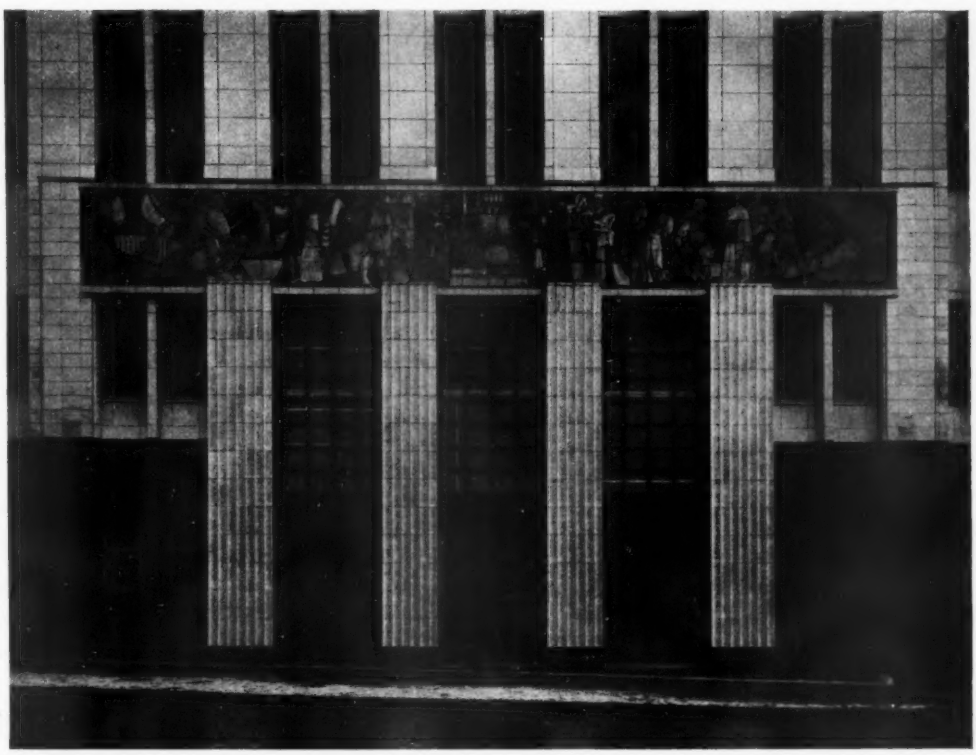
SITE—The new premises for Messrs. Doulton occupy a site about 100 yards east of the old premises, with a frontage of 70 ft. to Albert Embankment; the east side is almost at the corner of High Street, Lambeth. The site is known as the Doulton Dock site, as a large part of the space was originally a tidal dock used by the company for loading barges.

SHOWROOMS, ALBERT EMBANKMENT

T. P. BENNETT AND SON

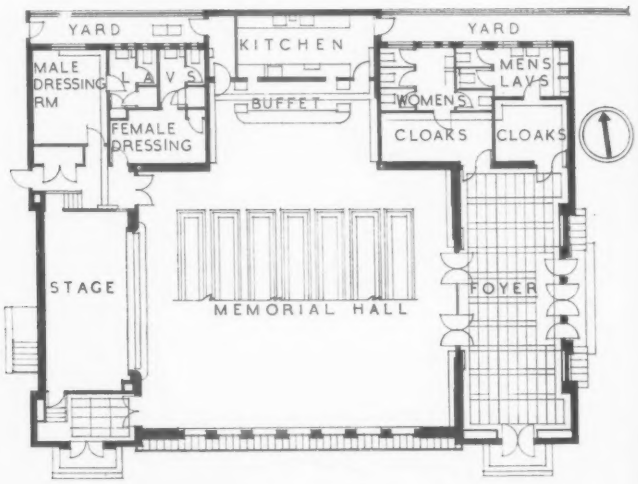
SITE PLAN



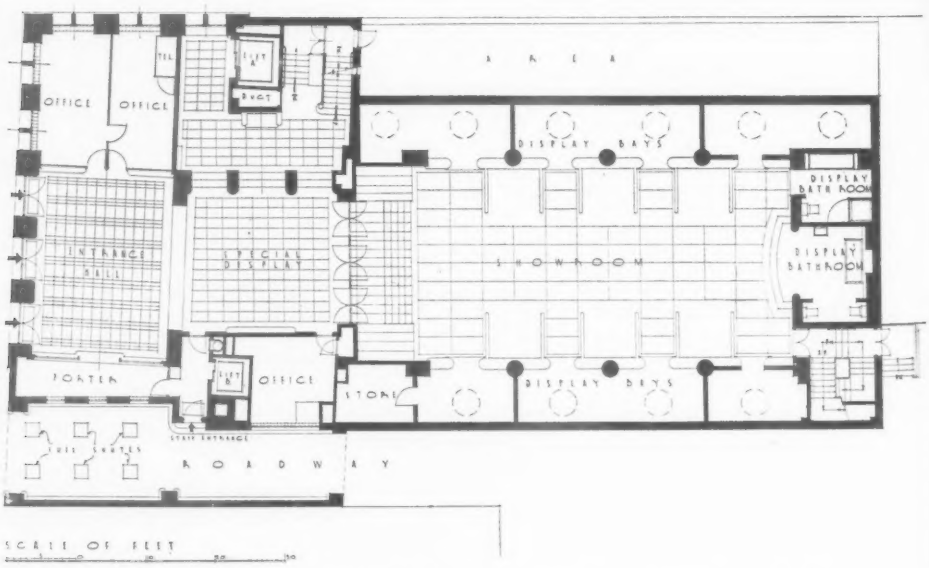


On the right is a detail of the main entrance, showing the decorative panel, designed by Gilbert Bayes, illustrating the theme of "Pottery through the Ages." It is carried out in different shades of salt-glazed stoneware manufactured by the firm. Top, view from Lambeth Bridge showing the new Doulton building on the extreme left. The tower of the old building can be seen on the extreme right.

MAIN OFFICE BUILDING: CROSS SECTION



PLAN OF THE MEMORIAL HALL

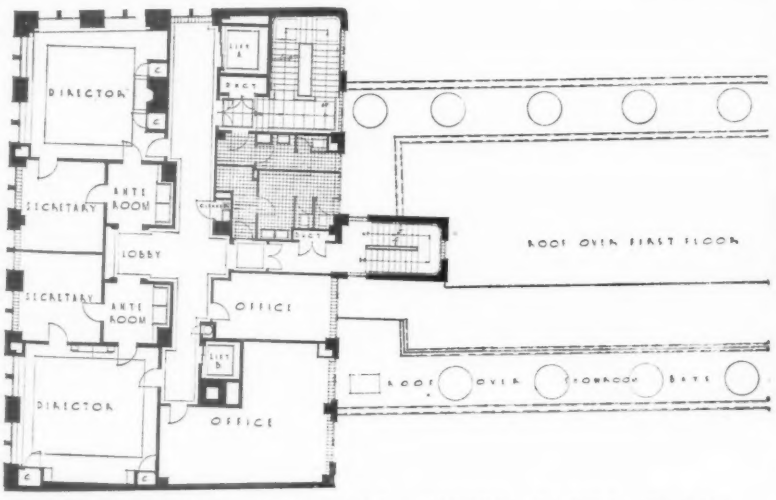


MAIN OFFICE BUILDING: GROUND FLOOR PLAN

PLAN — The new buildings comprise an Institute, a Memorial Hall and the main office building. The latter stands on the part of the site taken up by the tidal dock. It consists of two basement floors, ground floor and six upper floors, and a showroom wing with one upper floor, provision being made for four future floors if required. At the rear of the site, adjacent to Lambeth High Street, is the Memorial Hall, containing an auditorium to seat 250 people, with a stage, dressing-rooms, kitchen and buffet counter. It is for use by the staff for social activities, and facilities are provided for dancing, table tennis and theatrical and cinematograph performances. The Institute links the Memorial Hall to the rear of the showroom wing of the main building and is intended for members' use.

CONSTRUCTION AND EXTERNAL FINISHES—The main building, situated over the old dock site, is of steel frame construction

DOULTON'S OFFICES AND SHOWROOMS, ALBERT



MAIN OFFICE BUILDING: UPPER FLOOR PLAN

Above, Memorial Hall: Top, entrance hall leading through, on the axis of the building, to the display bays and showroom wing. Surrounding the hall are coloured tile panels depicting the coats of arms of the towns in which Messrs. Doulton's works are situated.

supported on a concrete raft foundation. Floors are hollow tile and the walls are brick panel with a glazed terra-cotta facing manufactured by the firm. The bronze entrance doors are framed by four fluted pilasters in gold terra-cotta. The Memorial Hall is constructed of brick, steel stanchions and beams being used for the auditorium only. It is faced with dove-grey mottled terra-cotta slabs, with a green band at plinth level. The institute is of similar construction, with stud and plaster board partitions internally.

EMBANKMENT • BY T. P. BENNETT AND SON

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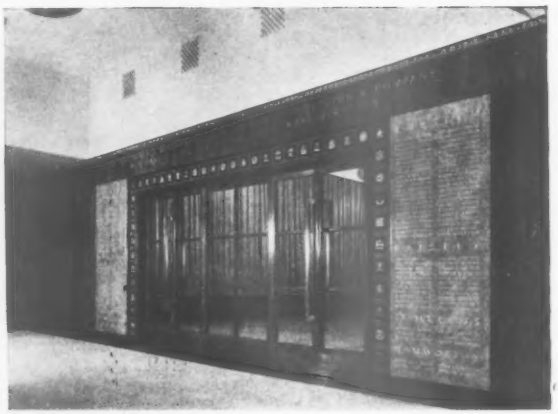

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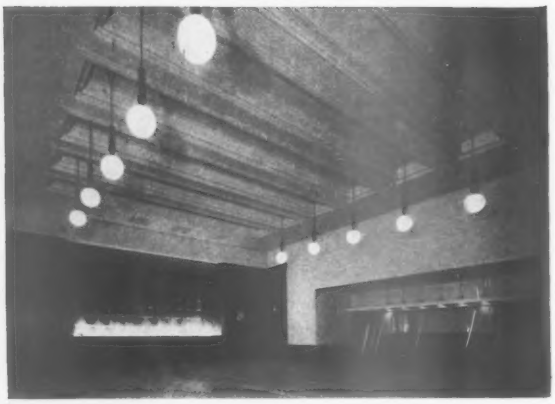

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1 : the Chairman and Managing Director's office. 2 : another Director's office. 3 : Entrance foyer in the Memorial Hall, showing the Roll of Honour of the employees of the firm who lost their lives in the Great War. 4 : auditorium in the Memorial Hall.
Left, part of the showroom wing on the ground floor level with bays for the display of baths and sanitary ware.

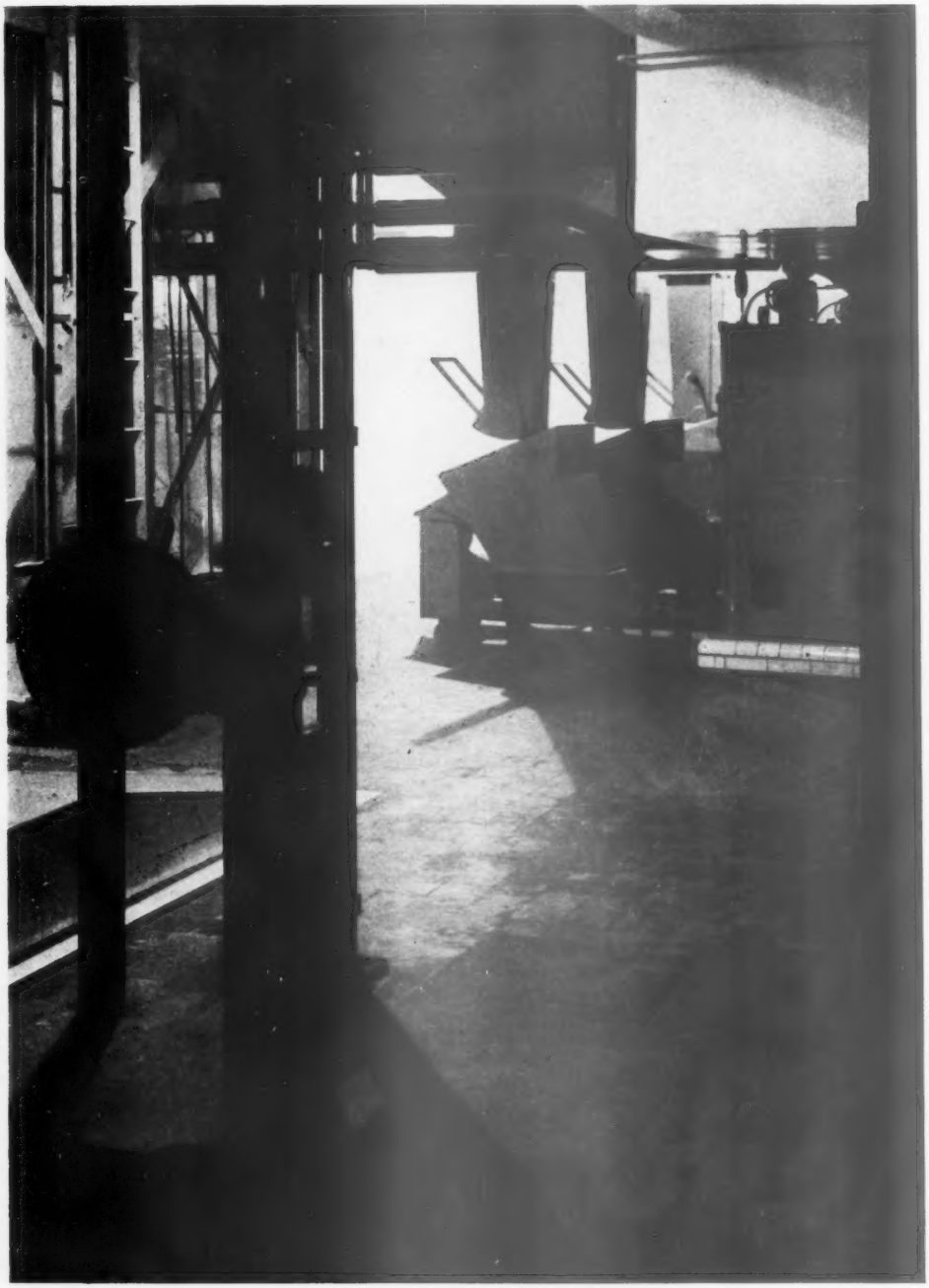
INTERNAL FINISHES — The main entrance hall, staircase and display hall are panelled with walnut veneer flush panelling, with a crossbanding of burr walnut. Floors throughout this section are of Imperial travertine with Tinos marble margins and coved skirtings ; for the remainder of the building sound-proofing floors are used, finished with 3 in. pyinkado strips except in the luncheon room, which has a maple floor. Indian

OFFICES AND SHOWROOMS, ALBERT EMBANKMENT,

Right: One of the bays in the showroom. Below, the corridor to the main clerical office.

laurel, figured teak, Australian black bean and Cuban mahogany are used for the panelling of the Reception and Board Rooms and Directors' and Secretary's offices. Lavatories, kitchens and store rooms have vitreous tiled floors, and the walls are tiled to a height of 5 ft. The entrance foyer in the Memorial Hall is panelled in figured teak with Zebrano cross-banding and floored with travertine. The floor of the auditorium is maple strip and the panelling similar to that of the entrance foyer.

BY T. P. BENNETT AND SON



A view in the boiler house

OFFICES AND
DESIGNED

ARCHITECTURE: 1919-1940*

LECTURE BY HOWARD ROBERTSON

IT was in the early twenties that the Secretary of the Architectural Association, Mr. F. R. Yerbury, a few other architects, and myself, went to Holland. We had heard of the wonderful new housing schemes, "complexes" as they called them, built in Amsterdam and Rotterdam, whole new quarters of them. We went, we saw, and we were conquered. Kilometres of marvellous brickwork, daringly thrown together in an entirely fresh (to us) plastic, and a skill in fenestration of which we in England certainly did not have the like. The work of the young architects like Kramer and de Klerk went to our hearts and heads. The Dutch were the boys for us (as they were once before) and back we hurried to write and illustrate. Mr. Yerbury is a wonderful photographer, so perhaps we can partly put upon him the blame for starting the modern movement in England.

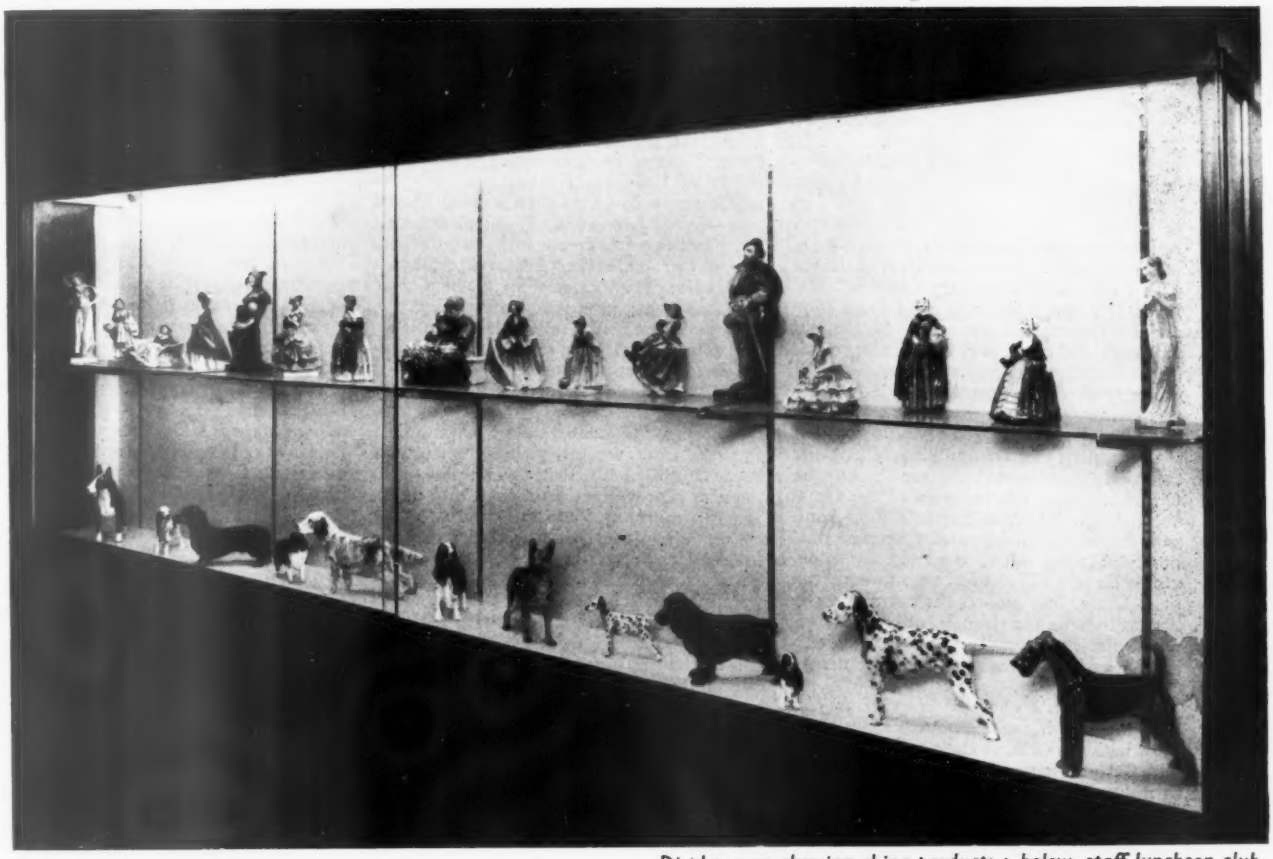
The Dutch sent an exhibition of their work to England, and soon the young architects began to go slightly Dutch. Then the more curious amongst us began to travel elsewhere, to Vienna for example, where one rediscovered Otto Wagner, Josef Hoffmann, and incidentally heard that a man called Corbusier had once passed that way but did not linger long.

The process of writing and photographing was repeated, with Mr. Yerbury as the evil genius. Denmark, Sweden, Germany, were all combed. It rained modern architecture in the English technical press, and the older generation mostly hated it. Of course our admiration was overdone. But there was plenty to feed it, and when one considers the number of Exhibitions which fed the flames it is not surprising.

Our own Wembley was still in the cyclops period, but abroad they had Gothenburg, Paris, Stuttgart, Dusseldorf, Stockholm, Brussels, and the Century of Progress in Chicago, all big Exhibitions, and all modern in sympathy.

Two events occurred which had effects

* A Paper read at a meeting of the Royal Society of Arts last week.



Display case showing china products ; below, staff luncheon club.

SHOWROOMS, ALBERT EMBANKMENT

BY T. P. BENNETT AND SON

SERVICES—The building is heated by an accelerated hot water system and vectairs, two calorifiers providing the hot water services. Separate ventilating plants are installed for the two basement floors and the kitchens on the sixth floor. Electrical wiring throughout is installed in a duct system under the floors, enabling light and power points to be tapped at 3 ft. intervals in any room. Two lifts serve the various floors. The Memorial Hall is heated independently of the main building by a gas-fired hot-water system, and also has an extract-ventilation plant for the auditorium. Heating for the Institute is supplied from the main building by vectairs ; individual gas water heaters provide hot water to the lavatories and bars.
General contractors were Holland & Hannen and Cubitts, Ltd. ; for list of sub-contractors and suppliers, see page xxii.

subsequently far-reaching, on evolution in design. One was the *Chicago Tribune* Competition in Chicago, where a design by the Finn, Eliel Saarinen, attracted a great attention because it broke away from a feature usual in the design of tall buildings, namely, the convention of giving it a base, shaft and cornice. Saarinen's building shot straight up as a sort of jet of piers and windows. The Americans saw in it the future of skyscraper design, and it was not long before English architects were using the same idea in the design of shops and office buildings. There have been many modifications of that crude idea since, and we have buildings like " Peter Jones " in Sloane Square to show how it has developed *via* experiments on similar lines in Germany.

The second event was the Paris Exhibition of 1925, which exemplified the sort of modern design which had not crystallized, and today is apt to be disdainfully labelled as " modernistic." There were some very significant buildings there, from Czecho-Slovakia, Poland, Sweden, and Russia, and they have all been used as the basis for further development. But tucked away in one corner was the Pavilion of a paper called *L'Esprit Nouveau* run by Ozenfant and the painter-architect who as a painter is called Jeanneret and as an architect Le Corbusier. This pavilion was given an indifferent site, with a tree in the middle of it. But Le Corbusier made a hole in his roof for the tree, and like an ingenious designer made capital out of his difficulties.

This pavilion was a sort of model cell made out of one of Le Corbusier's designs for a multiple dwelling-house. It contained the germ of many of the ideas which he has so skilfully publicised in his books and executed work.

Le Corbusier has learned much from the pioneer work of Adolf Loos in Vienna—all evolution is connected—and subsequently from Perret in Paris, but he is very much of an artist besides being a technical experimentalist and theorist. He and Ozenfant developed out of Cubism in painting a style known as Purism, and he applied polychromy to his interiors and exteriors in a very interesting way. His knowledge of the antique, his travels and studies, and his skill as a painter make of Le Corbusier an architect who takes a very special place as an *animateur*, and his influence has been very wide in this country

among the younger architects. Unfortunately his admirers are apt to borrow his idioms without attempting to develop his themes. Nevertheless his writings and designs spread like wildfire here and on the Continent, even to Sweden, which has an excellent modern trend of its own. Amongst buildings showing the Le Corbusier influences are many houses and flats in London and the country, designed for the most part in concrete. Functionalism has arisen very largely from Le Corbusier's description of the house as a *machine à habiter*, a statement which he has subsequently modified. But he is at heart a designer who loves form and structure for its own sake, who delights to dream and plan, and who is a romantic of the twentieth century.

Shortly after 1925, commercial interests in this country saw that there was a new sort of design afoot, and seized upon its externals for the design of office buildings, shops and factories. There came buildings like Drages, Crawfords, and the factories of the Great West Road. Many of the new shop-fronts were frankly detestable, and the commercial buildings were often designed by older architects who did not feel the movement in their bones, but dressed their structures in it so as to be in the swim. Out of this somewhat grim hotchpotch came the "modernistic" and the *moderne*, both terms of opprobrium today.

Le Corbusier's championship of *le plan libre*, the carrying of the house on posts and slabs with the walls as curtains and screens, and German experiments in building with continuous windows and supports inside soon also caught hold in England. The idea is not new. Factory architects used it years ago; it was seen in Ford's Detroit factories, and in Wrigley's factory in London, long before it came over from abroad with fresh prestige.

But applied to the dwelling-house it was novel, and allied with the use of reinforced concrete gave great flexibility to the house plan. The new houses had flat roofs, also a Le Corbusier feature, and their shapes were therefore free from the geometrical limitations of the old roofs of tile and slate. Everyone was enthusiastic at this progress, which is real. But such houses do not suit every taste, or meet the exigencies of every situation. The use of concrete, of large areas of glass, and an æsthetic based on a not always pure form, do not spell finality. Architectural design is still on the march, and the last word of today may well be the "has been" of tomorrow, so quickly in this hectic age does action breed reaction.

While experiments in new forms and materials proceeded, the ordinary traditional house, and commercial buildings also, have developed on lines less spectacular but interesting for all that. Better planning provided the touchstone. Economy, labour-saving, and efficiency became necessities owing to higher building costs and wages. At the same time a more intensive study of form and proportions followed as the result of enforced simplicity. The Georgian tradition, perhaps because of its straightforward character and its natural expression in the brickwork which suits England so well, has been the basis of a type of design which has good manners and is adaptable. It does not readily lend itself to large-scale commercial structures of a very open character, like shops or factories, but it provides a pretty satisfactory, if occasionally dull, type of street architecture. Curiously enough the Regency architecture, which is so adaptable to the demand for large windows and broad surface, has been neglected, or a style derived from Wren has been used as a theme, and that is why the results are so negative.

The main feature of our more recent tradition inspired work is a recognition of what in industrial design can be termed streamlining, a sort of tailored economy in form and detail, which makes for well-dressed street architecture. There are plenty of buildings of the poor but pretentious school—more than of the tailored type—but streamlining is alive, working away in the small details of homely articles like refrigerators and cookers and telephones and radios. Our period may not be a great one, but it has produced streamlining, the lessons of which need not be lost even if we return to frills. We may still see the streamlined antimacassar, or the streamlined aspidistra; unless the cactus is already that.

Analysing the contributions of the last 25 years' work, we may pick out one or two interesting themes which we can pass on to the next post-war generation to work upon.

In planning and design, there is the conception of the house as enclosed space standing on posts or pillars. This is the house schemed like a miniature department store, with semi-permanent divisions, lots of glass window, and adaptable to the most advanced conceptions of sociology because it is in fact flexible and impersonal.

Secondly we have the architects like Lloyd Wright and Mies Van der Rohe in Germany who are always searching for a new æsthetic expressive of an idea of living or of a purely mental attitude. They leave us with interesting experiments in the relationships of space, and with the fresh possibilities of interlocking interior and external space, creating an even flow from room to terrace and to garden.

Thirdly we have the pre-fabricated house, sold in packages in America, but not yet accepted as a solution to economic building. Linked with this there is a whole field, hardly touched as yet, of the pre-fabrication of units like kitchens and bathrooms, and research on these subjects by revolutionary inventors like Buckminster Fuller in the U.S.A.

Fourthly, we can show progress in mechanical equipment, services like heating, lighting, air-conditioning, all still a little primitive but ready for further steps forward.

If one may hazard a guess, our next drive is going to be for still more comfort and convenience. The problem of the future will be the provision of it with no money to pay for it. Comfort, security, low first cost and maintenance; problems like these form a nice little collection of headaches which we are bequeathing to the next architectural generation.

On the æsthetic side, it is quite possible that there may be brought about a renewal of the lost contacts between architecture and painting and sculpture. Our modernists have swept the floors and put away all the old familiar stage properties. The stage is now ready, but for what? The purity of the best modern work is its greatest asset, and perhaps it may become allied, as was the purity of Greek architecture, with those other arts from which so much sustenance is to be obtained.

Hollow concrete blocks being erected outside the premises of Hovis in Grosvenor Road, S.W.1.

SOCIETY OF ANTIQUARIES

Ordinary meetings this month at 5 p.m.: 8th, "The excavations at Atchana-Alalakh, 1939," by Sir Leonard Woolley; 22nd, "The excavation of the Sutton Hoo ship-burial," by C. W. Phillips, F.S.A.

R.I.A.I.

At the January meeting of the Council of the Royal Institute of the Architects of Ireland, Mr. G. A. Harrington, F.R.I.A.I., was unanimously elected Vice-President of the Institute for the year. Vacancy now occurring on the Council becomes filled by Mr. C. Dermot O'Toole, runner-up in the election for the Council.

The following Committees were appointed:
Professional Practice Committee: Messrs. H. Allberry, J. J. Robinson and J. H. Webb.
Publication Committee: Messrs. C. A. Harrington, J. O'Gorman, and T. F. Strahan.
Board of Architectural Education: Messrs. H. Allberry, G. Atkinson, R. M. Butler, J. V. Downes, L. F. Giron, T. F. Inglis, Vincent Kelly, F. B. Meehan, and Austin P. Meldon.
Premises and Finance Committee: Messrs. R. C. Keefe, T. F. Inglis, H. V. Millar and C. H. Mitchell.
Library Committee: Messrs. T. L. Cullimore, R. C. Keefe and H. G. Leask.
Town Planning Committee: Messrs. G. F. Beckett, D. FitzGerald, J. M. Mitchell, J. Moore, John O'Gorman, M. D. Robertson, Fergus J. Ryan and H. G. Simms.
Salaried Members Committee: Official—Messrs. J. E. Burke, T. P. Kennedy, J. F. Shortall and N. J. S. White. In Private Practice—Messrs. E. L. Crosby, A. F. Hendy and C. H. Mitchell.
Public Relations Committee: Messrs. J. V. Downes, T. P Kennedy, John O'Gorman and Fergus J. Ryan.
Joint Town Planning Committee: Messrs. G. F. Beckett, D. FitzGerald, Manning Robertson and J. J. Robinson.
Joint Committee of Architects and Engineers: Messrs. J. J. Robinson, H. Allberry, J. H. Webb, R. Donnelly and J. V. Downes.
Conditions of Contract Committee: Messrs. H. Allberry, L. F. Giron, J. H. Webb, J. M. Fairweather and J. J. Robinson.
Competitions Committee: Messrs. J. M. Fairweather, J. O'Gorman, J. V. Downes, W. Sedgwick Keatinge, V. Kelly, H. V. Millar and T. P. Kennedy.

WATFORD TOWN HALL

In the list of sub-contractors for the Watford Town Hall published in our issue for November 30 we inadvertently stated that Messrs. Dictograph Telephones, Ltd., were responsible for the telephones. This was incorrect. The work was executed by the Reliance Telephone Co., Ltd.

SPORTS PAVILIONS, BOURNEMOUTH

In the list of sub-contractors for the Sports Pavilions at Bournemouth, we inadvertently omitted the name of Modern Surfaces, Ltd., who were responsible for the seamless cement glaze, "Muroglaze."

The Information Centre owed its inception to the difficulties that arose when architects were faced with the problems of A.R.P. and other emergency work that followed the outbreak of war. After five months building work has become less hand to mouth and the various building controllers more generally known. But this does not mean that the need for the Centre has grown less. The passing of the first emergency has in fact stressed the need for an Information Centre to deal with all aspects of wartime building and architectural practice, and the Centre will continue to answer all such questions.

ARCHITECTS' JOURNAL

EMERGENCY

INFORMATION CENTRE

If you have a problem which demands an expert answer send it to:—

THE ARCHITECTS' JOURNAL,
45 THE AVENUE,
CHEAM, SURREY.
VIGILANT 0087

or ring:

THE A.J. INFORMATION CENTRE
FLAXMAN 5322

The Information Centre itself is working from London, but enquiries sent direct to the JOURNAL *will be passed on without delay.*

These are typical of the questions we have already answered:

What are the relative costs of sandbagging and brickwork?

How is a gas-lock formed?

How is a factory protected from incendiary bombs?

Are footings necessary to walls sub-dividing basement shelters?

How is wood protected against liquid gases?

How are ventilated black-out window screens formed?

How is sandbagging rotproofed?

How much safer is a 20-ft. deep shelter than a semi-surface type?

How is a light-lock formed?

How should screen walls be arranged?

How is a basement shelter protected from bursting water mains?

What is the definition of a light-proof material?

What publications are there on farm buildings?

What would be the maximum spread of debris if an h.e. bomb hit a 330-ft. stack?

What publications are there on camouflage?

What protection is needed for light shafts?

What is adequate provision for a first aid and decontamination centre?

Is a 1938 contract binding?

Who is responsible for making good air-raid damage to unfixed materials?

What is the cost per head of gas filtration?

Under what obligation is a building owner to provide shelter for the occupants?

How is a leaking shelter waterproofed?

How will the grant be paid?

Are cinemas to be provided with shelters?

Can blast-proof doors be used for naturally ventilated shelters?

Q162 TEMPLE BAR.—*Can you tell me where I can obtain OIL WATER HEATERS or geysers?*

Both Messrs. Clark Hunt* and Messrs. Industrial and Domestic Heaters† list types of oil water heaters. You could get in touch with them direct or through your local builder or plumber.

Q163 NORTHAMPTON.—*We have been supplying and fixing a number of precast reinforced CONCRETE AIR RAID SHELTERS of the family type. In the particular case under review, one of these was fixed at a client's house in the country, sunk to the usual depth of 5 ft. with ramp and steps at opposite ends. Drainage sumps were laid below the entrance steps. Everything was perfectly satisfactory until there was extremely heavy weather, when the shelter became flooded and the banks at the entrances commenced to collapse. We advised precast concrete retaining walls to both entrances, which we supplied on the instructions of our client, and fixed. The water was drained, but on the next heavy fall of rain the shelter again became flooded, the water rising through the sumps. Our client now refuses to pay his account, contending that we should have fitted solid concrete sumps for the purpose of taking surface water that may have accumulated. We have offered to fix solid concrete sumps and point all joints tight, but he still states that he will only pay our account after deducting a considerable amount of time which his man has spent in doing additional pointing, which in our opinion was unnecessary as all joints had been properly pointed. Such time, he states, he would charge at the same rate as that charged by us for our own men's time in fixing. We give no guarantee that any shelter of this type will under no circumstances be flooded, and shall be glad of your opinion on the following:*

1. Whether any such flooding after completion of the shelter on leaving in dry condition is our responsibility?

2. Whether the precaution of ascertaining as to whether the ground is water-logged or such that may become water-logged in heavy weather is the responsibility of the client before ordering?

3. Whether in the case of percolation of water either through the concrete itself, or through any joints—particularly in the entrance or exit—the responsibility is ours if no guarantee of watertightness is given?

We are naturally anxious to satisfy this client in putting right a difficult problem, but we consider that he has taken an unreasonable attitude in throwing the whole of the responsibility for the flooding upon our shoulders. The ground is 4 ft. deep of gravel and below that clay. The client states that had we sunk the shelter 4 ft. only instead of 5 ft., there would have been proper drainage, but as the water is 2 ft. deep in the shelter we stated that, even if the shelter had been fixed 1 ft. higher in the ground, he would still have 1 ft. depth of water in it, but this he does not agree. An expression of your opinion as to where the

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* *Clark Hunt & Co., Ltd., 159 Shoreditch High Street, E.1. (Bishopsgate 2131.)*
† *Industrial and Domestic Heaters, Ltd., 6 Fitzroy Street, W.1. (Euston 4809.)*

responsibility lies would be much appreciated.

Without inspection of the shelter and full knowledge of the facts leading up to the purchase and completion of the shelter, it is not possible to give you very specific advice. No general rule can be laid down as to the liability for the flooding of air raid shelters. Each case must be considered on the circumstances relating to it. In this case we assume there was no written contract setting out the terms and conditions for providing the shelter. Notwithstanding that there may be no written contract, the law implies in certain circumstances warranties and conditions, and the fact that you gave no specific guarantee does not mean that you are relieved of any liability in preventing flooding, which might be implied. You have apparently contracted to supply an air raid shelter and to instal it, so that it can be used for a particular purpose, and you took certain steps to prevent flooding which were apparently inadequate. In our opinion, there is an implied condition that the work, which was carried out by you, would be fit for the intended purpose, and from what you tell us it seems that unless there are any circumstances to the contrary the client is entitled to rely upon your knowledge and skill in carrying out the work. The answers to the questions are generally as follows:

1. Yes.
2. No, not necessarily.
3. Yes.

We have assumed that your client did not employ an architect to advise on or supervise the work, but if so there may be circumstances which would relieve you of your responsibility.

Q164 HUDDERSFIELD.—*The inquirer wished to know the names of manufacturers of oiled silk. This material, it is said, was used in the last war for the REPLACEMENT OF GLASS broken by action of high explosives.*

Below are the names of two of the leading firms* responsible for the treating and marketing of oiled silk in this country. The position as regards supplies either future or present is one on which there is no definite information. The production of oiled silk is dependent largely on silk imported into this country from Japan and at the moment there is a shortage of the silk in this country. Whether or not supplies will become available is no doubt a matter of policy unconcerned with the building industry. From inquiry it is believed that experiments are being carried out with English produced silk, but no definite results are as yet available. In any case such supplies of oiled silk as there are, or as become available, are to be had through the beforementioned firms. Failing supplies of oiled silk, use could be made of the thin clear plastic sheetings as manufactured by firms† in this country. The thinner varieties of these sheetings will be available at prices comparable with oiled silk and besides being no less weather resistant, the clear sheet should permit of a greater proportion of light being transmitted to the interior of the premises.

Q165 HOP.—*Is 6-in. concrete between filler floor joists, spaced at 2 ft. 6 in. centre to centre, suitable for OVERHEAD PROTECTION, and will it carry 400 lb./sq. ft. debris load?*

No. Filler joist construction is designed on the assumption that an arch is formed within the slab, and with a 6-in. slab this arch would be no more than 2 in. thick. While this would carry a considerable load equally distributed over a number of spans, it would fail immediately any load fell on one span only, giving unsymmetrical loading. Where an existing filler joist floor is to be used as the ceiling of an air raid shelter, steel decking should be arranged, capable of carrying the debris load. Where no debris load has to be considered, the 6-in. concrete will be sufficient protection against splinters or falling shrapnel.

Q166 NEWCASTLE-UPON-TYNE.—*In the case of a commercial building, COMPENSATION is paid to tenants in two ways,* (a) *a lump sum payment in compensation for disturbance during building, and* (b) *decrease of rental for loss of accommodation. In computing the cost of shelters, for the purpose of obtaining Treasury grant, it is presumed that* (a) *can be included. Can* (b) *also be included, and if so, over how many years can the loss of rental be calculated?*

(2) *Can an estimated cost for MAINTENANCE and subsequent removal of strengthening materials be included in arriving at total cost of shelters?*

(3) *On Form CBS2 (Completion Report), page 3, separate columns are provided for EXPENSES of a capital nature, and expenses of a revenue nature, both with reference to constructional work. Can you give some information or examples to show the distinction?*

The Civil Defence Act refers to grants only with regard to capital expenditure. Doubtless any compensation which is to be paid by the landlord under Section 19, subsection 1, is capital expenditure. It would also be capital expenditure if the landlord suffers such damage himself for which he would be entitled to compensation by the landlord if he were an occupier. If the annual value of a building were considered to be definitely decreased by the provision of a shelter, this decrease would constitute a reduction in the value of the property and thus might be considered a capital expenditure, but according to Section 19, sub-section 2, the impairing of the use of any part of a commercial building entitles the occupier of that part to reduction of rent for a period of ten years only (sub-section 7) so that the property as such is not affected. The owner is, therefore, not entitled to a grant for a decrease of rental.

(2) There is no mention of subsequent removal of strengthening material and it must be realized that the passing of the Civil Defence Act is independent of the present war and that strengthening material thus is not to be removed after the war unless a new Act is passed by Parliament repealing or amending the Civil Defence Act. It cannot be forecast whether or not such a new Act will be put before Parliament or when this may happen, but any expense incurred by the removal would be a matter to be dealt with by such new legislation. Maintenance is not mentioned in the Act, but as it certainly is not capital expenditure, there can be no question of receiving a grant for it.

(3) The following example may give some idea of expenses of capital nature and revenue nature. For a commercial building, in which 700 people are employed, a shelter is to be provided in the basement. This basement is partly occupied by a restaurant, on a long lease, and it is necessary to use a part of this restaurant for the shelter, as there is no other possibility of providing the necessary accommodation. Another part of the basement up to now used for storage by the owner of the building is also to be absorbed by the air-raid shelter. Owing to the disturbance created by the erection of the shelter the restaurant is compelled to close for three weeks, but it can be re-opened afterwards, although it will

* *Messrs. Robert Watson & Co., Ltd., 3 Featherstone Buildings, London, W.C.1. Messrs. Abbott, Anderson and Abbott, Ltd., 17 Fore Street, London, E.C.2.*

† *B.X. Plastics, Ltd., Hale End, London, E.4. May and Baker, Ltd., 42 St. Paul's Churchyard, London, E.C.4. British Cellophane, Ltd., 17 Stratford Place, London, W.1. I.C.I. (Plastics), Ltd., 2 Buckingham Gate, London S.W.1.*

THE USE OF STEEL SECTIONS AS COLUMNS & STRUTS:

Columns and struts can be carried out in a great variety of sections; examples of the groupings are shown on Sheet No. 11 of this series.

GROUP (4): struts for trusses or other purposes, consisting of one or two angles or channels. This Sheet deals with angles only.

FIG. 1.

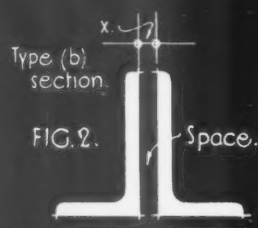

FIG. 2.

Double unequal angles spaced, shorter legs outstanding.

FIG. 3.

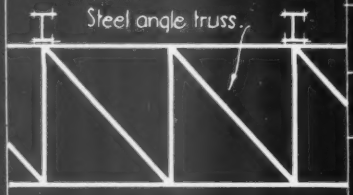

FIG. 4.

Double unequal angles spaced, with shorter flanges butting against gusset plates. See notes overleaf.

TABLE GIVING EFFICIENCY FACTORS (e) FOR B.S.S. SINGLE AND DOUBLE UNEQUAL ANGLE SECTIONS AS CENTRALLY LOADED COLUMNS (STRUTS

Size of each angle. ins.	Min. spacing x, ins.	Type of section *	LENGTH OF COLUMN OR STRUT IN FEET. 6	6·5	7	7·5	8	8·5	9	10	11	12	13	14	16	18	20
2½ x 2 x 3/16	·	(a)	0·22	0·19	0·17	·	·	·	·	·	·	·	·	·	·	·	·
	·	(b)	0·41	0·37	0·33	0·29	0·26	0·24	0·22	0·18	0·15	0·13	0·12	·	·	·	·
3 x 2 x ¼	·	(a)	0·23	0·20	0·17	·	·	·	·	·	·	·	·	·	·	·	·
	0·6"	(b)	0·50	0·46	0·43	0·39	0·36	0·33	0·30	0·26	0·22	0·19	0·16	0·15	·	·	·
3 x 2½ x ¼	·	(a)	0·33	0·28	0·25	0·21	0·19	0·17	·	·	·	·	·	·	·	·	·
	·	(b)	0·51	0·47	0·44	0·40	0·36	0·33	0·30	0·26	0·22	0·19	0·16	0·15	·	·	·
3½ x 2½ x ¼	·	(a)	0·35	0·30	0·26	0·23	0·21	0·19	0·17	·	·	·	·	·	·	·	·
	0·5	(b)	0·55	0·52	0·49	0·47	0·44	0·40	0·37	0·33	0·28	0·25	0·22	0·19	0·14	0·12	·
3½ x 3 x 5/16	·	(a)	0·42	0·37	0·34	0·30	0·26	0·24	0·21	0·17	·	·	·	·	·	·	·
	·	(b)	0·54	0·51	0·48	0·46	0·44	0·40	0·37	0·33	0·28	0·25	0·22	0·19	0·14	0·12	·
4 x 2½ x ¼	·	(a)	0·35	0·30	0·26	0·23	0·21	0·19	0·17	·	·	·	·	·	·	·	·
	1·20	(b)	0·59	0·57	0·54	0·52	0·50	0·47	0·45	0·40	0·35	0·31	0·27	0·25	0·19	0·15	0·12
4 x 3 x 5/16	·	(a)	0·43	0·38	0·35	0·31	0·27	0·25	0·22	0·18	·	·	·	·	·	·	·
	0·30	(b)	0·59	0·57	0·54	0·52	0·50	0·47	0·45	0·40	0·35	0·31	0·27	0·25	0·19	0·15	0·12
4 x 3½ x 5/16	·	(a)	0·53	0·47	0·41	0·38	0·35	0·30	0·28	0·23	0·19	0·17	·	·	·	·	·
	·	(b)	0·58	0·56	0·53	0·51	0·49	0·46	0·44	0·39	0·34	0·30	0·26	0·24	0·19	0·17	0·12
4½ x 3 x 5/16	·	(a)	0·43	0·38	0·35	0·31	0·27	0·25	0·22	0·18	·	·	·	·	·	·	·
	0·90	(b)	0·61	0·60	0·58	0·56	0·54	0·52	0·50	0·46	0·41	0·36	0·33	0·29	0·24	0·18	0·16
5 x 3 x 5/16	·	(a)	0·43	0·38	0·35	0·31	0·27	0·25	0·22	0·18	·	·	·	·	·	·	·
	1·40	(b)	0·63	0·61	0·60	0·59	0·57	0·56	0·54	0·50	0·46	0·41	0·38	0·33	0·27	0·23	0·19
5 x 3½ x 3/8	·	(a)	0·56	0·50	0·44	0·40	0·37	0·33	0·30	0·25	0·21	0·18	·	·	·	·	·
	0·80	(b)	0·63	0·61	0·60	0·59	0·57	0·56	0·54	0·50	0·46	0·41	0·38	0·33	0·27	0·23	0·19
5 x 4 x 3/8	·	(a)	0·64	0·59	0·54	0·49	0·44	0·40	0·37	0·31	0·26	0·22	0·19	0·17	·	·	·
	·	(b)	0·63	0·61	0·60	0·59	0·57	0·56	0·54	0·50	0·46	0·41	0·38	0·33	0·27	0·23	0·19
6 x 3 x 3/8	·	(a)	0·43	0·38	0·35	0·31	0·27	0·25	0·22	0·18	·	·	·	·	·	·	·
	2·30	(b)	0·65	0·64	0·63	0·62	0·61	0·60	0·59	0·56	0·53	0·50	0·47	0·43	0·36	0·31	0·26
6 x 3½ x 3/8	·	(a)	0·56	0·50	0·44	0·40	0·37	0·33	0·30	0·25	0·21	0·18	·	·	·	·	·
	1·80	(b)	0·65	0·64	0·63	0·62	0·61	0·60	0·59	0·56	0·53	0·50	0·47	0·43	0·36	0·31	0·26
6 x 4 x 3/8	·	(a)	0·66	0·60	0·55	0·50	0·46	0·41	0·38	0·33	0·27	0·23	0·20	0·17	·	·	·
	1·20	(b)	0·65	0·64	0·63	0·62	0·61	0·60	0·59	0·56	0·53	0·50	0·47	0·43	0·36	0·31	0·26
7 x 3½ x 7/16	·	(a)	0·55	0·49	0·43	0·39	0·36	0·32	0·29	0·24	0·20	0·18	·	·	·	·	·
	2·90	(b)	0·67	0·66	0·65	0·64	0·63	0·62	0·61	0·60	0·58	0·56	0·53	0·50	0·45	0·39	0·34
7 x 4 x ½	·	(a)	0·65	0·60	0·55	0·50	0·45	0·41	0·38	0·32	0·27	0·23	0·20	0·17	·	·	·
	2·60	(b)	0·67	0·66	0·65	0·64	0·63	0·62	0·61	0·60	0·58	0·56	0·53	0·50	0·45	0·39	0·34
8 x 3½ x 7/16	·	(a)	0·54	0·48	0·42	0·39	0·36	0·31	0·29	0·24	0·20	0·18	·	·	·	·	·
	3·70	(b)	0·68	0·67	0·67	0·66	0·65	0·65	0·64	0·62	0·60	0·58	0·57	0·54	0·50	0·45	0·40
8 x 4 x ½	·	(a)	0·64	0·59	0·54	0·49	0·44	0·40	0·37	0·31	0·26	0·22	0·19	0·17	·	·	·
	3·00	(b)	0·68	0·67	0·67	0·66	0·65	0·65	0·64	0·62	0·60	0·58	0·57	0·54	0·50	0·45	0·40
8 x 6 x ½	·	(a)	0·84	0·82	0·79	0·75	0·72	0·69	0·65	0·58	0·51	0·44	0·39	0·36	0·28	0·23	0·19
	0·75	(b)	0·68	0·67	0·67	0·66	0·65	0·65	0·64	0·62	0·60	0·58	0·57	0·54	0·50	0·45	0·40
9 x 4 x ½	·	(a)	0·63	0·58	0·53	0·48	0·44	0·40	0·37	0·31	0·26	0·22	0·19	0·17	·	·	·
	3·80	(b)	0·68	0·68	0·67	0·67	0·66	0·66	0·65	0·64	0·62	0·61	0·60	0·58	0·54	0·50	0·46

* (a) refers to single angle in accordance with Fig. 1; (b) refers to double angles in accordance with Fig. 2; x = minimum spacing, where mentioned in table. Where not mentioned any spacing would be suitable.

The values given to the right of, or above the zig-zag line may be applied to secondary compressive members. They should not be applied to main structural columns or struts, for which the values lie to the left of the zig-zag line. The criterion is a slenderness ratio of 150.

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• 775 •

STRUCTURAL STEELWORK

Subject : Economical Column Sections, No. 7

General :

This series of Sheets on steel construction is not intended to cover the whole field of engineering design in steel, but to deal with those general principles governing economical design which affect or are affected by the general planning of the building. It also deals with a number of details of steel construction which have an important effect upon the design of the steelwork.

Both principles and details are considered in relation to the adjoining masonry or concrete construction, and are intended to serve in the preliminary design of a building, so that a maximum economy can be obtained in the design of the steel framing.

This Sheet is the seventeenth of the series, and sets out in tabular form the comparative economic efficiencies of columns or struts consisting of one or two unequal angles sections, centrally loaded.

Unequal Angles :

Single unequal angles (Fig. 1) are inferior to equal angles of the same weight, and their efficiency coefficients decrease in value as the difference between the flange lengths increases.

Unequal angles are rarely used as columns, but they may be employed for small trusses as diagonals or chords, as the eccentricity is smaller than for equal angles. The longer flange then butts against the gusset plates. (Fig. 2.)

Double unequal angles (Fig. 2) are superior to equal angles if they are placed back to back, but they are particularly uneconomical if spaced at more than a certain distance apart. They cannot compete with struts formed of two channels or two joists and are, therefore, rarely used as columns alone. They are very convenient for chords and diagonals of trusses, however, particularly as their optimum spacing is much smaller than that of channels.

Connections :

Unequal angles offer usually better possibilities for connections than chords of two equal angles, as the flanges butting on to the gusset plates are wider.

Loading and Buckling :

See formula and general clauses on the back of Sheet No. 11 of this series.

In certain cases with unequal angles, when the buckling lengths are different for the *x*—*x* and *y*—*y* axes, as for instance with the upper chord of the truss shown in Fig. 3, it is worth while using the angles in the positions shown in Fig. 4. No general efficiency coefficients can be given for this instance, as they would depend on both the buckling lengths.

Efficiency Coefficients :

For general clauses, see back of Sheet No. 12 of this series. The factors for the single angle (type (*a*) section) struts shown on this Sheet can never be greater than 1.00, nor less than 0.17. The factors for double angle struts (type (*b*) section) can never be greater than 0.70, nor less than 0.12.

Owing to the rather unsatisfactory radius of gyration of single angles for the buckling length given on this Sheet, the efficiency coefficient of one angle is in fact never greater than 0.84, while that of a double angle practically reaches its maximum and comes up to 0.68.

The coefficients are worked out for the smallest standard thickness of every type of angle, but the difference of the coefficients belonging to angles of greater thickness is never greater than 1 per cent., and may be neglected.

Previous Sheets :

Previous Sheets of this series dealing with structural steelwork are Nos. 729, 733, 736, 737, 741, 745, 751, 755, 759, 763, 765, 769, 770, 772, 773 and 774.

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be slightly smaller. The goods which the owner had stored in the basement must be transported elsewhere, where they will be kept in future. In this case, compensation can be claimed: (*a*) by the occupier of the restaurant for loss due to the temporary suspension of his business and for any repairs which may be necessary to his premises due to damage by the transport of materials; (*b*) by the owner himself for the cost of transport of the stored goods, including insurance and other accessories. If both these compensations are assumed together to amount to £2,100, they are to be added to the cost of the shelter, which might be, say, £2,450, and the total capital expenditure would thus be £4,550, or £6 10s. per occupant. (£7 is, except in extraordinary cases, the limit which would be acknowledged by the Treasury.) The occupier of the restaurant would also be able to claim a reduction in rent, but if he has a lease, the unexpired term of which is more than ten years, the decrease will be valid for ten years only. Furthermore, the owner will now have to pay rent for the stored goods which he can reasonably maintain he would otherwise pay to himself. Both these last two items constitute loss of revenue, which in the case of the reduction of rent from the occupier of the restaurant, might be £80 per annum, and for the stored goods £40 per annum, the total loss of revenue thus being £120 per annum.

CURRENT PROBLEMS: *12th Article*

TEMPORARY & SEMI-PERMANENT BUILDINGS

BY EUGENIO FALUDI AND GODFREY SAMUEL

5: STEEL AND CONCRETE COMPONENTS AND WET CONSTRUCTION. PART I.

BEFORE dealing with wet construction proper, *i.e.*, systems of construction in which mortar is used to join the units together, we shall examine some forms of steel and concrete frames which, subject to small adjustments, are much the same whether "dry" or "wet" infillings are used.

There are also intermediate types of infilling, *e.g.*, blocks which are of concrete or clay but with interlocking instead of mortar joints. These will be considered with other block materials.

Many systems of light steel and concrete construction, especially concrete, are now receiving special attention on account of the scarcity of timber and superfluity of cement. Most of them are sponsored by manufacturers who naturally wish to have their material used for as much of the building as possible. In many cases, one element, e.g., a concrete wall panel, may be useful and economical, while another, e.g., a concrete roof panel, may not be. The tendency to consider the whole question of temporary building in terms of the all-timber building, the all-steel building, the all-concrete building, etc., is an extremely dangerous one, and will certainly involve a great waste of national capital if it is not quickly revised. A good system must combine the most suitable and readily available materials in each component part.

For this reason, rather than examine alternative systems as such, we prefer to consider in the same order as before the various component elements:

A. FRAME.
B. ROOF.
C. WALLS.
D. PARTITIONS.
E. FLOORS.
F. FOUNDATIONS.

A. THE FRAME

Materials available are: (i) *Steel;* (ii) *Concrete;* (iii) *Timber.*

Timber has already been considered in our second article of this series.

In considering the relative merits of steel and concrete, there are certain general factors that may determine the choice of material.

(i) *Steel:*

Advantages are: (*a*) Rapid erection; (*b*) Small section; (*c*) Greater flexibility.

Disadvantages are: (*a*) Need for protection of the material against weather and sometimes fire; and *at present* (*b*) The demand for steel for more urgent purposes.

(ii) *Concrete:*

Advantages are: (*a*) Good weather resistance; and *at present* (*b*) Availability. Disadvantages are: (*a*) In transport and handling, larger and heavier members; (*b*) Less rapid erection.

By the use of light-weight aggregates, however, or chemically formed air pockets (cellular concrete) considerable reduction in weight is possible, but it must be borne in mind that the strength is also reduced, in the case of light-weight aggregates up to about 60 per cent. In blocks and panels these devices have the advantage of increasing the insulating value. Alternative forms are:

TABLE I	Wt. in lb. per cub. ft.	Thermal conductivity
1. Aggregates:		
(*a*) Gravel ..	130–150	8.0–12.0
(*b*) Clinker ..	70–100	5.0–9.0
(*c*) Breeze ..	50–75	2.1–4.5
(*d*) Pumice ..	40–58	1.28–2.7
2. Cellular concrete:		
(*a*) 1 cement, 4 sand ..	56–83	1.6–3.0
(*b*) 1 cement, 1 sand ..	31–63	0.8–1.8
(*c*) Neat cement	12–31	0.3–0.8

There are different types of cellular concrete, some having the necessary chemical action induced statically, others by vibration. It must be remembered that concrete frames do not avoid the use of steel, but merely reduce it.

(i) *Steel frames* may be of different types:

(*a*) *With wide bays and standard sections.*—Advantages are ease of erection (since the roof can be completed early in the programme) and, for larger buildings, economy of material.

The bay unit is determined by (1) the use of the building (*see* A. J., January 11); (2) the type of panel: the practical limit of unsupported length; (3) the maximum loading capacity of a particular standard stanchion.

The most efficient bay is generally 12 ft. to 13 ft.

This is the most economical type with block panels. An example with wood wool is shown in Fig. 1. The details of steel frame construction are too well known to be further described here.

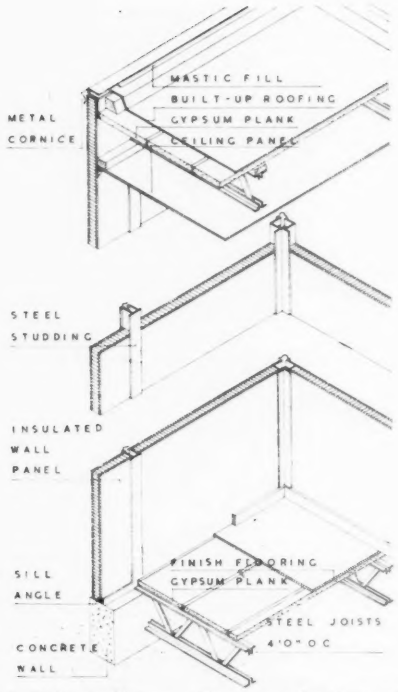
(*b*) *With narrow bays and standard sections.*—Advantages are the possibility of using lighter types of panel construction, and of course, lighter steel, which is easier to handle. Examples are shown in Figs. 2, 3 and 4.

The first (low cost) has advantages in good protection for the joints and easy assembly, but the use of a heat reflecting metal surface is open to criticism.

The second (Rostone), Figs. 3, 4 and 5, is dry construction, the blocks interlocking.

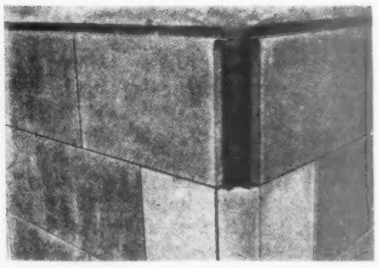
The third (Corkanstele), Fig. 6, is also dry, but more expensive.

(*c*) *Tubular Sections.*—Advantages are rapid assembly and disassembly, for very temporary structures. Different types of dip are available. An American



1 *Light steel frame with gypsum flooring and wood wool infilling panels. (Eterna, Italy).*

4 *Rostone.*



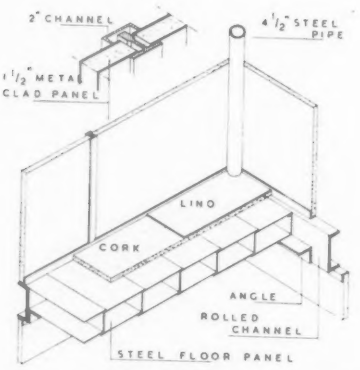
5 *Rostone.*

system has been devised combining tubular frame and tension wires (Fig. 7). It has advantages in light weight, but the tensioning and surfacing require a good deal of skilled labour.

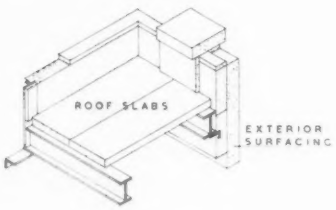
(*d*) *Pressed steel sections.*—Advantages are light weight and cheap production (Figs. 8 and 9).

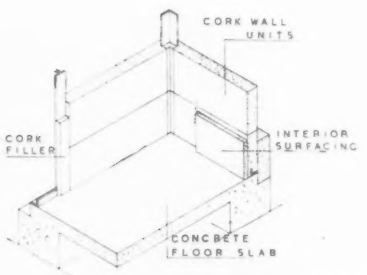
(*e*) *Strip sections.*—Advantages again are light weight and cheap production. 12-16 gauge steel is used, assembled by either (i) nailing with special nails, or (ii) welding in the shop and bolting together on the site.

Sections may be (1) Angles ; (2) Channels ; (3) Boxes : These may be

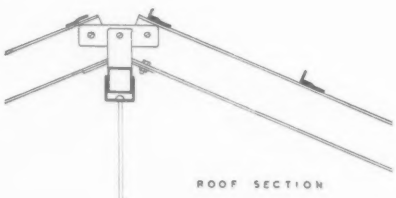


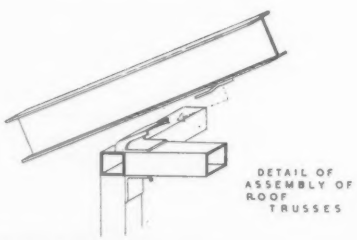
2 *Steel frame with corner columns of 4½ in. piping. Panels of 1½ in. insulating board faced with thin gauge steel, painted, and held by the combination of steel tee, channel and screw (low cost farmhouse), U.S.A.*



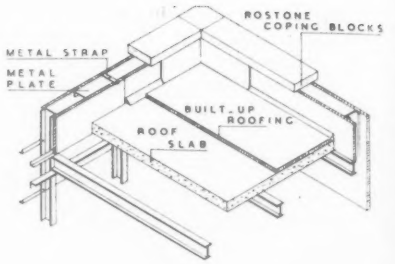


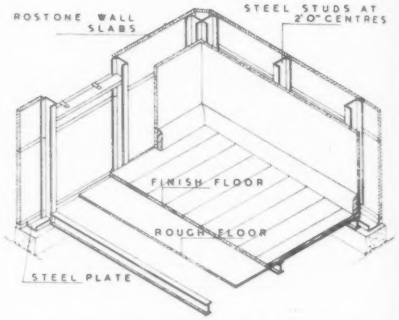
6 *Steel frame of double 1½ in. by 1¼ in. angles at 3 ft. centres, bolted to continuous angle, anchored to foundations. Panels of 3 in. Corkcrete (cork and cement) 12 in. wide, held by steel clips (Corkanstele, U.S.A.).*



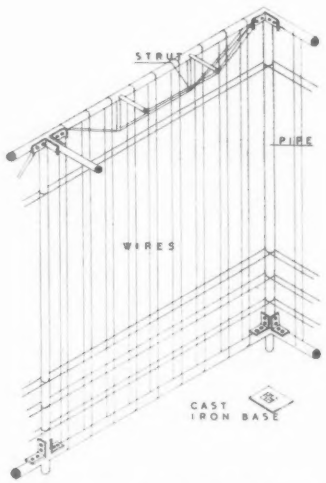


8 *Pressed steel sections.*

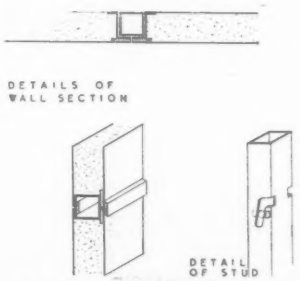




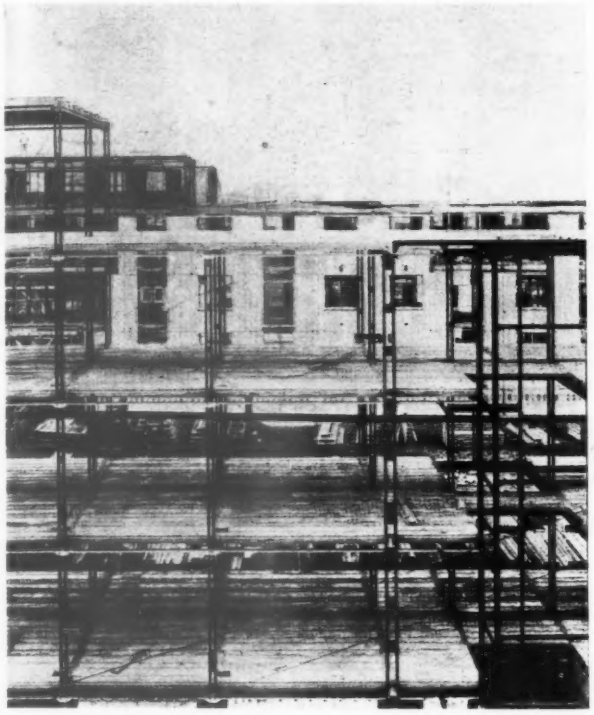
3 *Steel frame of channels (studs) and angles supporting slabs 23¾ in. by 15¾ in. and 14¾ in. by 15¾ in. (Rostone, U.S.A.).*



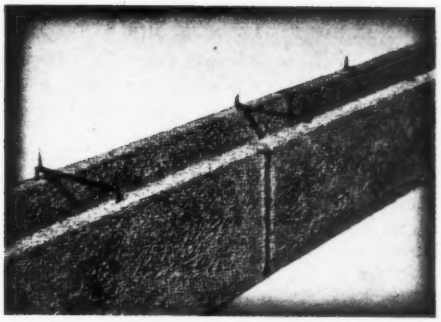
7 *Steel frame of tubes filled with concrete, for floor, walls and roof, joined by bolts, through angle flanges. Wire reinforcement is wrapped round and held in tension. After erection, plaster or rendering is applied to metal lathing or wire mesh. (Suspension Steel, U.S.A.).*

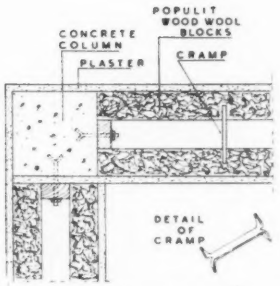


9 *Angle strip steel sections.*

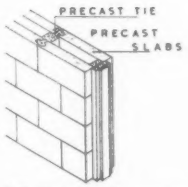


10 *Mopin system (France).*



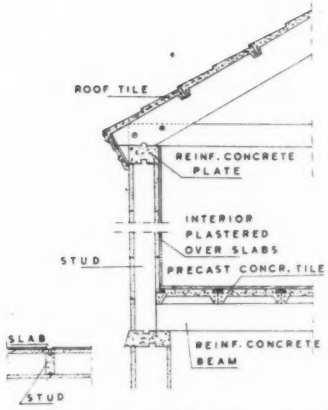


11 *Concrete frame with wood wool blocks. (Populit, Italy).*

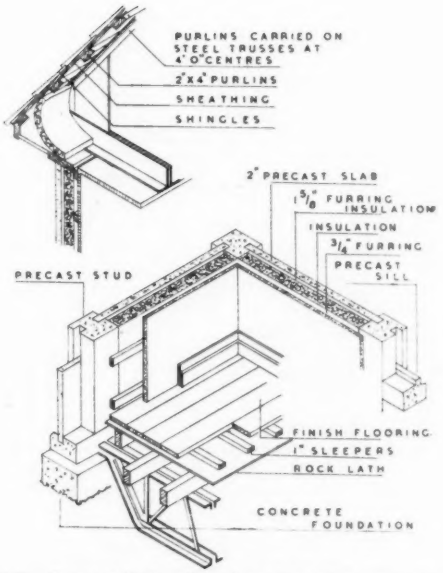


12 *Pairs of precast slabs bedded in mortar and held together by precast columns. (Swingler, England.)*

13 *Combination of monolithic structural members and precast fillers. (Duo-slab, England.)*



14 *Precast 2 in. by 8 in. grooved R.C. studs at 18 in. centres with precast concrete slabs inside and out. (Parkhurst, U.S.A.).*



15 *Precast R.C. cill and studs at 4 ft. centres, all grooved to receive precast concrete slabs. (Swan House, U.S.A.)*

stiffened against buckling with wood (Markus, Hungary) or concrete cores.

A type of frame intermediate between steel and concrete is that commonly associated with the name of Mopin. (Fig. 10).

A light steel framework is prepared in the shop, welded, riveted or bolted, of pressed sheet steel (either mild steel, stressed to 8 tons per sq. in., or high tensile steel, stressed to 12 tons per sq. in.), semi-rust-proofed, and assembled like " Meccano " on the site.

This frame weighs about half that with standard steel sections, being designed to act at first as scaffolding only, for the distribution and erection of the light wall and floor units, until the concrete (reinforced or not) has been formed round stanchions, beams and filler joists, when the combination of materials produces in effect a reinforced concrete frame designed for permanent loading. The system is more useful for multi-storey than for single-storey building. (Fig. 10.)

(ii) *Concrete frames* can be (1) pre-cast; (2) cast on the site but not in position; (3) cast in position.

The first has the greatest advantages except for heavy members, when the second is preferable. The third is only useful for very small works. In both the latter cases, rapid-hardening or high-aluminous cement or vibrated concrete allow an earlier removal of shuttering.

Frames can be :—

(*a*) *With wide bays.*—Advantages are similar to those with steel, but excessive weight of members may be a

disadvantage. An example with wood wool blocks is shown in Fig. 11.

(*b*) *With narrow bays.*—Advantages are again as with steel. Examples are shown in Figs. 12-15.

1. (Swingler, Fig. 12). This has an advantage in strength, but requires expensive casting.

2. (Duo-slab, Fig. 13). This has good jointing, but the columns must be cast *in situ.*

3. (Parkhurst, Fig. 14). This has simple units, and is a form of dry construction.

4. (Swan, Fig. 15). This is a simple and cheap system, but heavy.

B. ROOF.

The same types of roof discussed in Article 2 are available for steel or concrete frames or block construction. These are, however, further types (Table I).

For temporary and semi-permanent building they are generally too heavy and often require wet construction and site shuttering. They are only useful if all other materials fail.

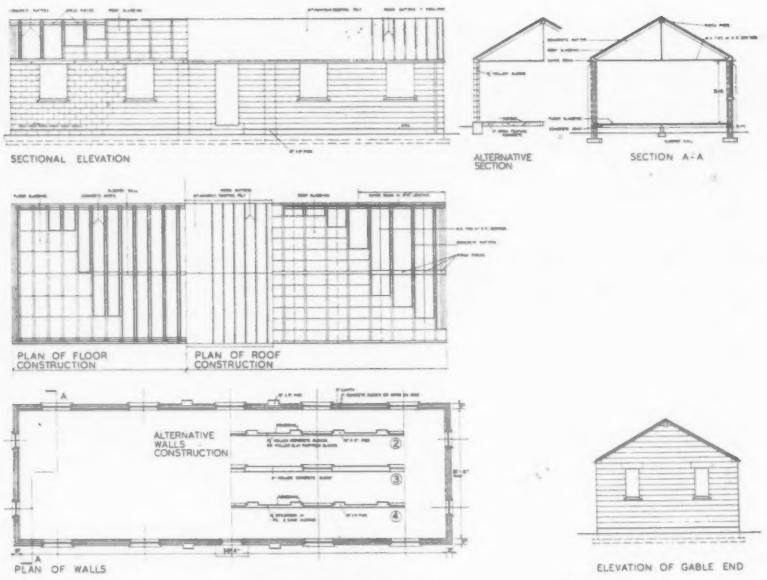


Figure 1

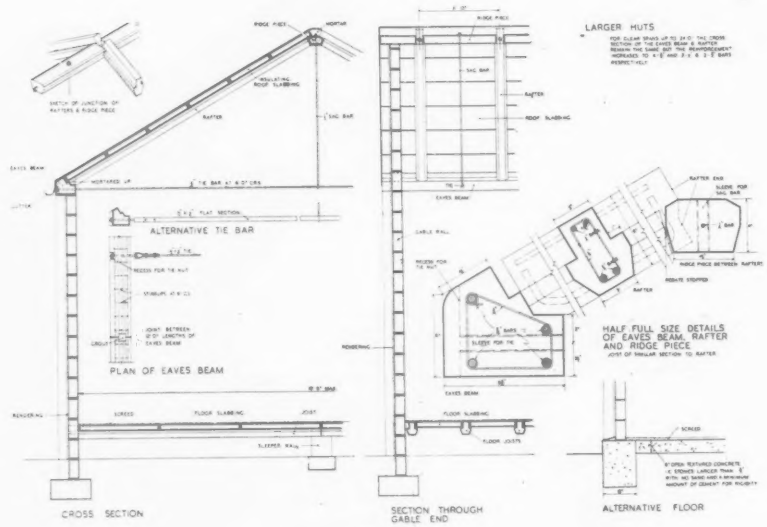


Figure 2

CONCRETE FOR BUILDINGS

The Cement and Concrete Association has just issued a Second Memorandum on the use of concrete for buildings for Army, Air Force and evacuation camps, office and other purposes for Government department staffs, and schools. This memorandum deals with a simple rafter type of roof.

INTRODUCTION

The suggestions shown in the illustrations (figs. 1 and 2) and outlined in the following notes, are intended to be of assistance in the erection of the simplest type of roof with materials which are readily available.

The design has been produced on the assumption that a high grade concrete is employed of a nominal mix of 1 : 1½ : 3 or 1 : 2 : 3 for field work, dependent on the grading or method of manufacture, but *no responsibility can be accepted for its sufficiency.*

In brief, the suggestion is that precast concrete rafters, placed as in normal domestic work, shall thrust against an eaves beam 12 ft. long, tied at 6 ft. centres, the filling between the rafters being of light-weight insulating slabs placed dry. The rafters and eaves beams weigh approximately 2 cwt. and 6 cwt. respectively, while bituminous sheeting is used to cover the roof. Similar section beams and filling, screeded over, can be used for a suspended floor, or an alternative floor on the ground can be employed. Four types of economical supporting wall are indicated.

ROOF

Rafters have been designed on a basis of 3 ft. spacing and light-weight filling not exceeding 15 lb. per sq. ft.; the exact spacing and cross section of the rafter can be varied to suit the filling. The particular section shown was considered advisable if the rafters were cast on the site and appreciable erection stresses were anticipated, the ledges supporting the filling slabs and increasing lateral rigidity.

Wellinlith, Thermacoust, Gypklith, or special gypsum blocks can be used for filling and, where the covering is of bituminous felt, hollow tiles or Shiskoff units can be used. When using a concrete tile, slate or asbestos-cement tile covering, it is advisable to insert thin wooden strips for fixing purposes, or to mark the light-weight slabs in some way as a guide to the tiler.

The lower end of the rafter is formed to rest in a corresponding longitudinal groove in the eaves beam and is set on a mortar, "Keecon," or equal bed. At the ridge the rafters rest during erection on a propped longitudinal 6 in. timber, on which ridge pieces are laid to serve both as spacers and ridge ties. The pocket formed by the top ends of the rafters and the ridge pieces, into which small bars project, is filled with cement mortar, while holes are left in all ridge pieces to provide for the sag bar where necessary.

EAVES BEAMS

Eaves beams are cast in 12-ft. lengths, holed to take two ties 6 ft. apart, so that the thrust is evenly balanced and the stresses reduced to the minimum. The use of identical 12-ft. lengths obviates the need for special end beams and simplifies future additions. It has the effect, however, of making the overall length of roof a multiple of 12 ft., so that the actual length of the hut is lessened by the thickness of gable wall and any overhang.

The eaves beams are designed to act as lintels over a 6 ft. opening and any span in excess of this figure may result in an undue excess of weight. Supporting walls should therefore provide a uniform support, or have piers at 6-ft. centres.

It is suggested that eaves beams should be precast with recesses at the ends so that a mortar key will ensure the sections of the wall being true to line. Ties may consist of round bars threaded at the ends. If, however, the hut is likely to be used as a gymnasium, the use of steel plates is recommended.

WALLS

Four alternative types of wall are indicated :

1. A tied wall, with each leaf consisting of concrete blocks or bricks on edge, with stiffening piers in the longer walls.

2. A 4½ in. concrete block wall with 9 in. thick piers at 6 ft. centres and rendered externally.

3. A wall of hollow 9 in. concrete blocks rendered externally.

4. A wall consisting of 4½ in. brickwork with 9 in. thick piers at 6 ft. centres, laid in a 1 : 3 cement mortar and rendered externally.

In view of the lateral distributing power of a roof of this type, it is suggested that alternative No. 2 will provide a sufficient and economical solution.

FLOORS

Where suspended floors are considered essential, beam units of similar cross section to the rafters, but closer together, can be employed with a ½ in. screed of cement mortar on top of the insulating filling. Where a reasonably level site is available, it may be possible to provide sufficient insulation by using 5 in. or 6 in. of open textured concrete, if finished off with a 1 in. screed on newspaper or similar material to prevent loss of cement. (Open textured concrete is composed of coarse aggregate with minimum cement to bind the stones in position *i.e.*, a mix of approximately 1 : 18.)

LARGER SPANS

Where huts of 24 ft. span are required, the reinforcement on eaves, beams and rafters must be increased, but the cross section of concrete may remain the same.

HOUSING

Simple designs of the type outlined lend themselves readily to the use of a variety of insulating slabs and roof finishes, and also allow reasonable variations in the nature of walling material employed.

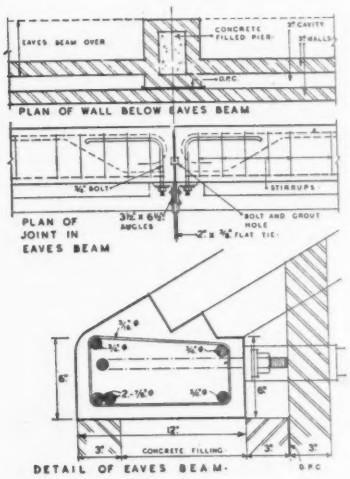
Where timber is not available, a pitched roof of this type could, with minor modifications, be used in normal domestic housing. The principal changes involved would be a slight eaves projection and more complete provision for the fixing of tiles or slates.

In the event of a wide adoption of the schemes suggested,

it is possible that standard rafters and eaves beams would become available from concrete products manufacturers.

AMENDMENT FOR TIES AND PIERS AT 12 FT. CENTRES

In the drawings overleaf the roof ties are shown at 6ft. centres, as this would appear to give the most economical solution. If, for other reasons, ties at 12 ft. centres are essential, the detail below may be followed.



This detail shows the variation in the size of the eaves beam and method of fixing the ties. The detail of the rafters and the ridge piece remains unaltered.

The eaves beam is designed to span 12 ft. horizontally and acts as a lintel. Thus supporting piers are necessary only at 12 ft. centres.

Note.—For the 24 ft. wide hut the section of the eaves beam remains the same, but the reinforcement varies as follows: ⅜ in. diam. bars increased to ⅝ in. diam.; ⅝ in. diam. bars increased to 1 in. diam.

Buildings Illustrated

DOULTON'S NEW PREMISES, ALBERT EMBANKMENT (pages 160-168). Architects: T. P. Bennett and Son. General contractors were Holland & Hannen and Cubitts, Ltd., Messrs. Trollope and Colls, Ltd., being responsible for foundations only. Sub-contractors and suppliers included: Redpath, Brown & Co., Ltd., structural steelwork; Waygood-Otis, Ltd., lifts; Attoc Blocks, Ltd., hollow tile floors; Troughton and Young, Ltd., electrical work—main building electric light fittings; Bective Electrical Co., Ltd., electrical work—Memorial Hall; Chatwood Safe Co., Ltd., strong-room doors; Bostwick Gate Co., Ltd., dividing grille in strong-room; Crittall Manufacturing Co., Ltd., metal windows; Matthew Hall, Ltd., plumbing, heating, hot water and ventilation; Gas Light and Coke Co., Ltd., gas services; General Asphalte Co., Ltd., asphalt; Doulton & Co., Ltd., sanitary fittings and glazed faience ware; Palmer's Travelling Cradle and Scaffold Co., travelling cradle apparatus; Haywards, Ltd., cellar flaps; J. W. Gray and Sons, Ltd., lightning conductor and flagstaff; F. A. Norris & Co., Ltd., lantern lights and lay-lights; Haskins, roller shutters; H. W. Cullum & Co., Ltd., soundproof floors; Diespeker & Co., Ltd., terrazzo; Hollis Bros. & Co., Ltd., wood flooring; Sankey-Sheldon, Ltd., steel partitioning; Henry J. Greenham, Ltd., facing bricks; Carter & Co., Ltd., floor and wall tiling; Joinery and Builders Supplies, Ltd., flush doors; Allen and Greaves, Ltd., steel platform; Conrad Parlanti, Ltd., bronze entrance doors, decorative metalwork, railings, etc.; Anselm Odling and Sons, marble flooring; Pulsometer Pump Co., pumps; English Clock Systems, Ltd., electric clocks; Frazzi, Ltd., flat roof finishings; G. J. Green and Son, fibrous plasterwork; Wm. Sugg & Co., gas incinerators; Newalls Insulation Co., Ltd., acoustic tiling; Holland & Hannen and Cubitts, Ltd., special joinery and panelling; Cellulin Flooring Co., Cellulin flooring; Carter and Aynsley, Ltd., door furniture; Courtney Pope, Ltd., special door furniture, special screens and glazed balustrading; Franco-British Electrical Co., neon sign; Franco-Signs, Ltd., non-illuminated sign; E. J. and A. T. Bradford, Ltd., special wood carving and lettering for war memorial; James Farquharson and Sons, kitchen equipment; Empire Stone Co., Ltd., artificial stone steps, kerbs and pavings; Comyn Ching & Co., Ltd., bronze mat-well frames; B. Cohen and Son, Ltd., special furniture, carpets and curtains; North British Rubber Co., Ltd., rubber flooring and mats; A. J. Binns, Ltd., coat-rails and hangers; Nobel Chemical Finishes, Ltd., paints and varnishes; Bratt Colbran, Ltd., special fireplaces; Herbert Morris, Ltd., travelling pulley block; Buckleys (London), Ltd., bronze nameplate; Roneo, Ltd., steel office furniture; Merryweather and Sons, Ltd., fire extinguishers; F. H. Pride, Ltd., electrical dimmer control panel — Memorial Hall; Woollens' Cine Service, sub-standard cinematograph equipment; William Mallinson and Sons, Ltd., special veneers; Bull's Super Silent Motors by Bull Motors (branch of E. R. and F. Turner), Ltd.

Green Belt

Some 230 acres of land in Kent and Surrey are to be added to the Green Belt, and the L.C.C. is contributing towards the cost of acquisition. The areas concerned are 114 acres at Farningham, Kent, consisting mainly of woodland, and 115 acres adjoining Selsdon Wood, Farleigh, Surrey. During war-time, parts of the areas which are not woodland may be used for agricultural purposes, on the understanding that they will be available for the public as soon as possible after the war.