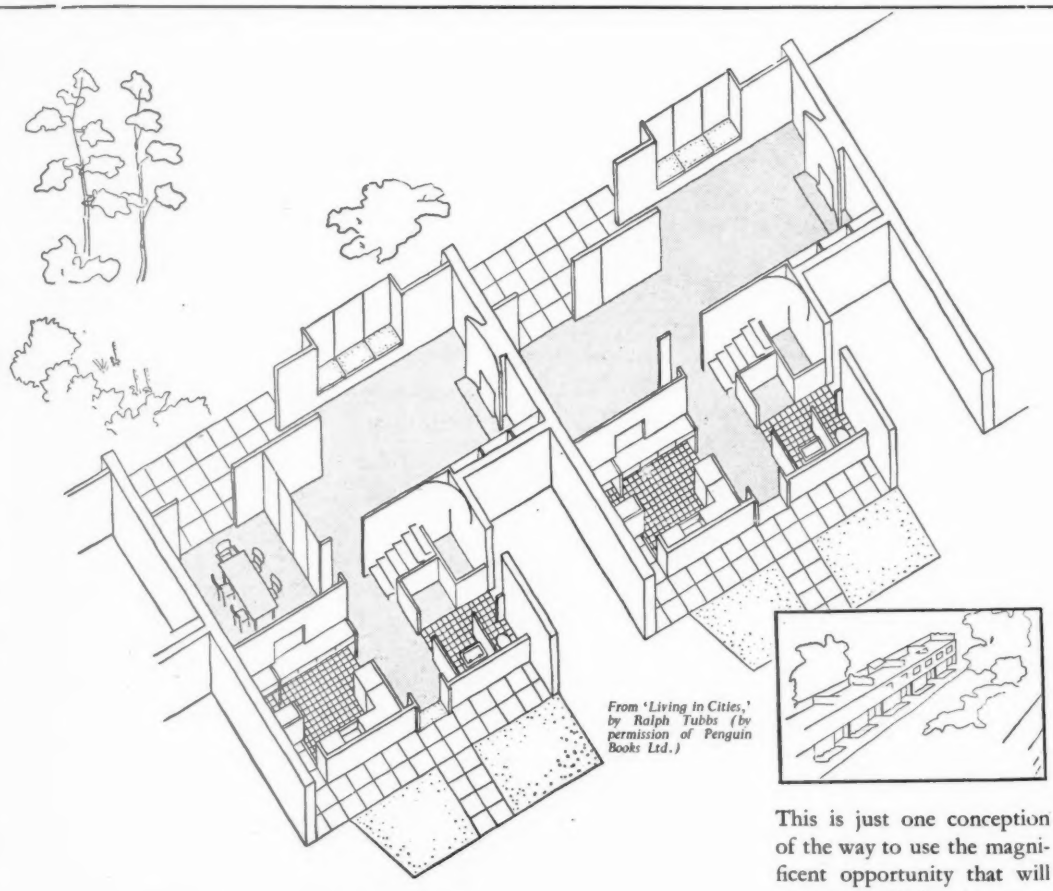

From 'Living in Cities,' by Ralph Tubbs (by permission of Penguin Books Ltd.)

The Window of the New World

★ ★ ★

This suggestion shows how a home can be designed for the maximum amount of light, useful space, privacy and efficiency. It is a home that can be run easily; one that would be a constant source of pride and happiness to those who live in it. Is it too much to hope that post-war home-building will place these considerations first?

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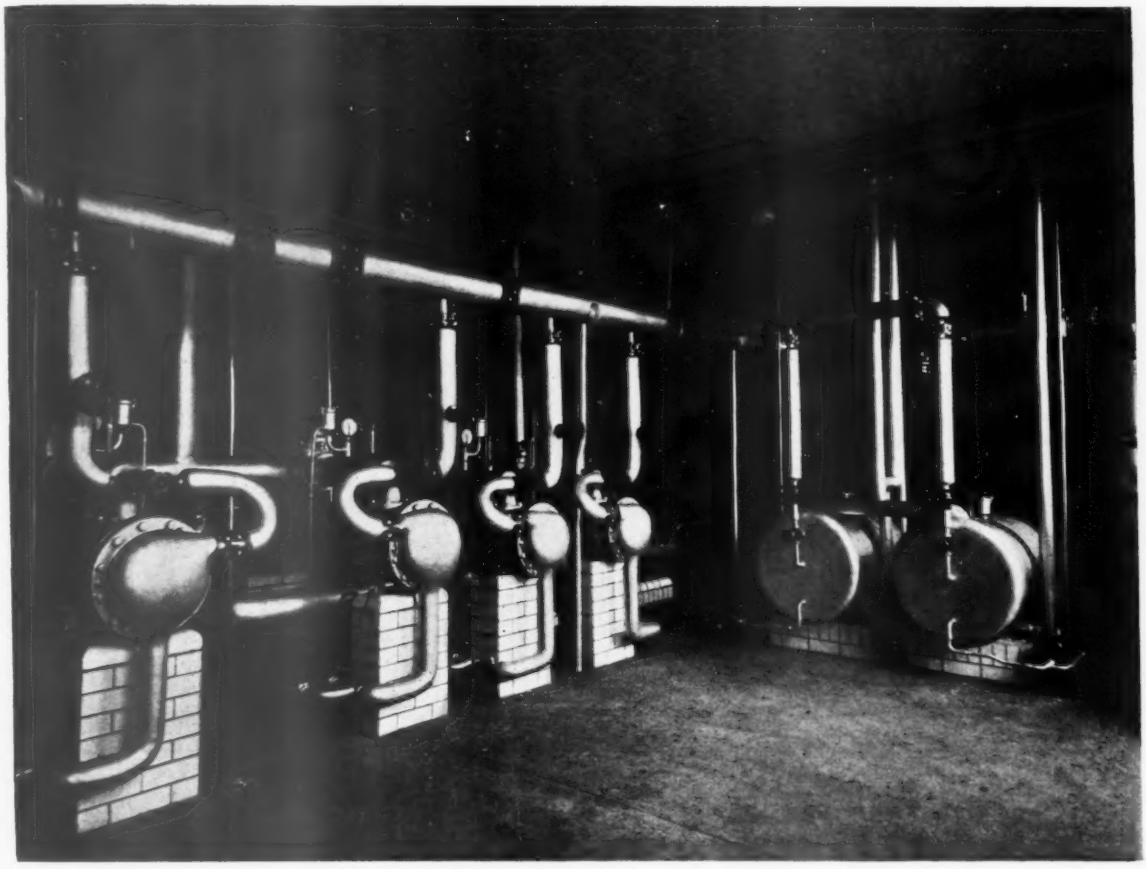

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The application of Reinforced Concrete to NON-INDUSTRIAL BUILDINGS

Article number ten in a series on the principles and practice of reinforced concrete construction. It is suggested that each article should be cut out and kept in a personal file for this series and for other information relating to reinforced concrete construction.

Hitherto, this series has attempted to demonstrate the applicability of reinforced concrete construction to the planning of office, domestic and industrial buildings. Equally well established—as is witnessed by the accompanying illustrations—are the claims of this structural medium in the design of exhibition and assembly halls, canteens, garages, churches—in fact for any building where spaces have to be spanned with little or no interruption of floor space. The can well claim to lose nothing of the dignity proper to such buildings by being erected in modern reinforced concrete instead of the traditional—and more costly masonry.

Designs for large garages necessitate that the supports for floors and roofs shall be widely spaced (or eliminated altogether) and the accompanying illustration is but one of the many satisfactory results of such planning in reinforced concrete.

Further examples—of covered swimming baths, railway stations, aeroplane hangars, etc.—are legion and the vision of architects combined with the technical skill of structural engineers has bequeathed, and will continue to

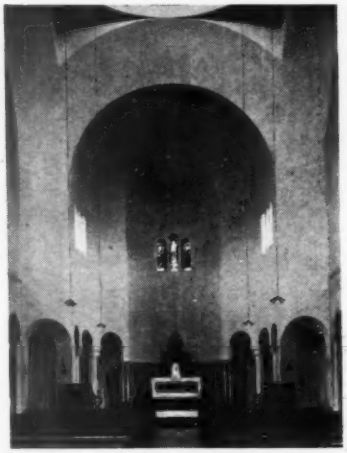
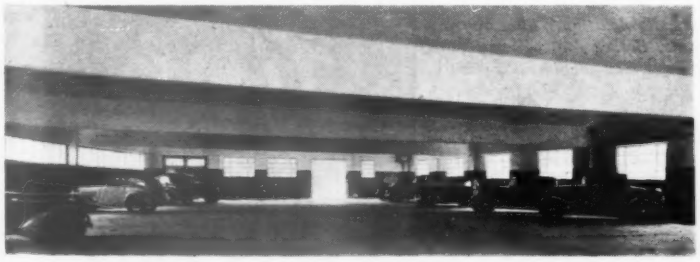


illustration showing a well-known exhibition hall fully bears out this claim. A feature of the canteen and entertainment hall combined—actually this particular structure was erected with precast units—is the complete absence of roof ties, thus lending qualities of spaciousness and good lines to a utilitarian building. The church interior illustrated

contribute, hosts of dignified and economically constructed buildings in reinforced concrete.



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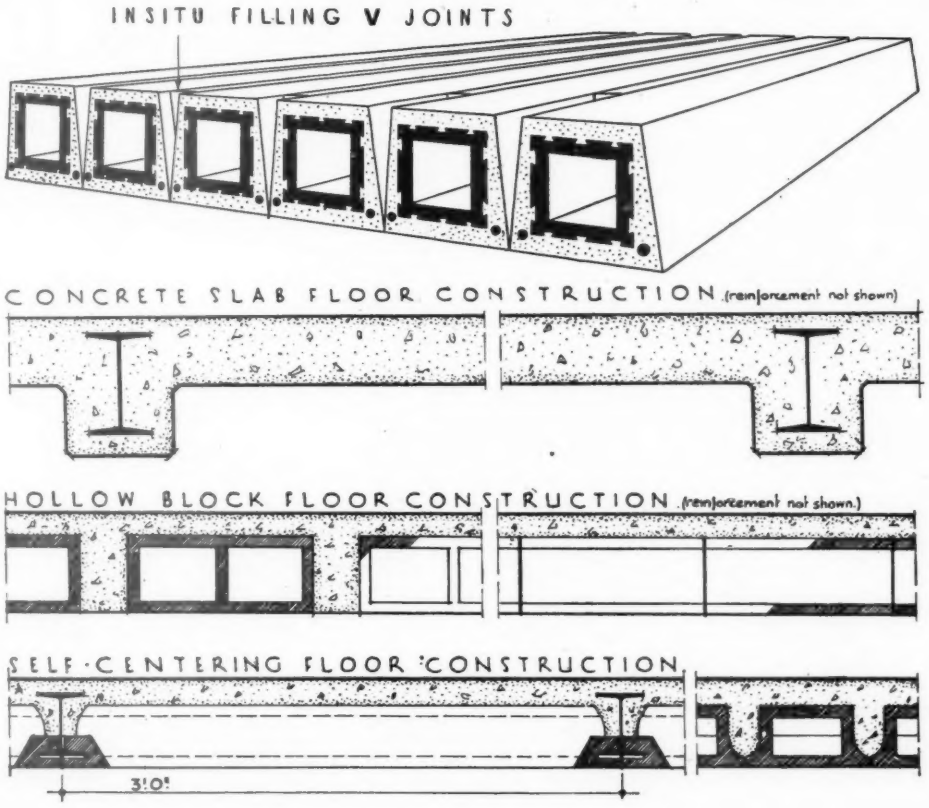

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The Editor will be glad to receive MS. articles and also illustrations of current architecture in this country and abroad with a view to publication. Though every care will be taken, the Editor cannot hold himself responsible for material sent him.

THURSDAY, NOVEMBER 5, 1942. NUMBER 2493: VOLUME 96

PRINCIPAL CONTENTS

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this JOURNAL *should not be taken as an indication that they are necessarily available for export.*

Owing to the paper shortage the JOURNAL, *in common with all other papers, is now only supplied to newsagents on a "firm order" basis. This means that newsagents are now unable to supply the* JOURNAL *except to a client's definite order.*

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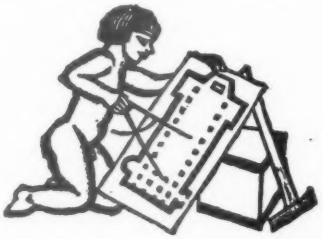


from AN ARCHITECT'S *Commonplace Book*

"The feudal ownership of land did bring dignity, whereas the modern ownership of movables is reducing us again to a nomadic horde. We are reverting to the civilization of luggage, and historians of the future will note how the middle classes accreted possessions without taking root in the earth, and may find in this the secret of their imaginative poverty."

Howards End, *By E. M. Forster.*

Though every news item is news to someone, it doesn't follow that all news has the same value for everyone. The stars are used to draw attention to the paragraphs which ought to interest every reader of the Journal.

★ *means spare a second for this it will probably be worth it.*

★★ *means important news, for reasons which may or may not be obvious.*

Any paragraph marked with more than two stars is very hot news indeed.

N E W S

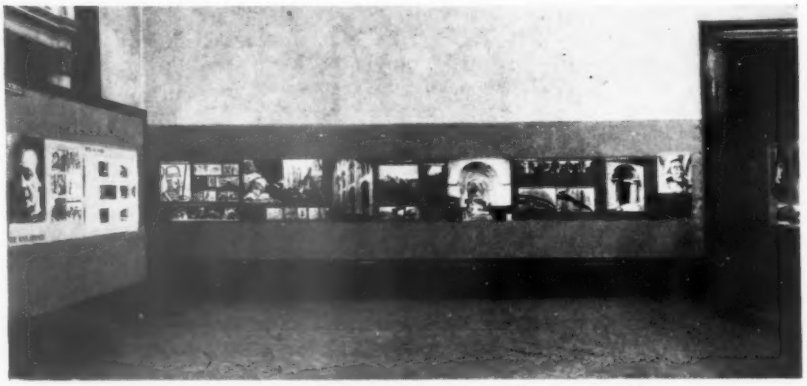
★

A speech by Mr. Henry Strauss, Parliamentary Secretary, MOWP., at a meeting on October 28 of the Central Council of Civic Societies, in which he referred to the megalomania of VISTA-MONGERS, *was replied to by Sir Charles Bressey at the Royal Academy on the following day. Here are points from both speeches.*

MR. STRAUSS. The beauty of the English town is a compact and intimate beauty. It is to be found in Bath, Farnham, Chippenham, Stratford-on-Avon, York, Salisbury, Burford, Chipping Campden and a score of others. We shall be mad if we sacrifice that glorious tradition to the megalomania of vista-mongers. I am frankly terrified of the men who describe themselves as enthusiastic town planners and whose one idea is to place every important building in the middle of a void. You can immensely overdo the amount of space around a building even if that building is St. Paul's. . . . I want London to remain London, not to be an inferior imitation of some foreign capital which has never had its charm or known its magic. . . . But in spite of all London's losses, I, like most Londoners, have never loved or admired her more than I do now. When London is rebuilt I trust it will be in our own idiom and in the vigour of our own tradition. This does not mean, of course, that the new buildings should not be modern. We do not want a London in fancy dress. The new buildings should be as worthy of the twentieth century as Bath is of the eighteenth.

SIR CHARLES BRESSEY. I was shocked and alarmed at hearing on the wireless last night a national warning about the irrevocable damage and havoc that might be wrought by "this pernicious new sect of vista-mongers." A vista is, after all, only a pleasing view of handsome buildings skilfully disposed. The greatest vista-mongers we have had were men of considerable repute, of whom the greatest was Sir Christopher Wren. Is not London sufficiently large and broad-minded to tolerate just a few more views? On the whole I think it is. Opposed to the vista-mongers stands the great school of higgledy-piggledy, which has a very easy job indeed, involving no effort or training at all, in allowing the buildings to sprout up like weeds in a garden, though unfortunately they last considerably longer.

In the course of a discussion on Manchester's Housing needs with a Deputation from the City Corporation, the Minister of Health (Mr. Ernest Brown) said that all local authorities should follow the example of Manchester and Sheffield and begin now to prepare at least a ONE YEAR'S HOUSING PROGRAMME. *Further points from the Minister's speech appear on page 304.*



Part of the Englishman Builds *Exhibition, designed by Ralph Tubbs, now on view at the National Gallery. Further illustrations appear on pages 293-294.*

★★

A scheme has come into operation in Liverpool whereby POLISH ARCHITECTURAL UNDERGRADUATES *who, with the German occupation, thought that their careers, if not ended, were held up for several years, are resuming their studies. The scheme is to be officially inaugurated tomorrow.*

Following an agreement, sponsored by the British Council, between the Polish Government and the University of Liverpool, facilities have been provided for about 60 Polish students, who had already embarked on their professional studies in Poland, to complete their courses in the Liverpool School of

Sir Charles Bressey

In 1938 Sir Charles Bressey hit the headlines when his Highway Development Survey of Greater London was published. This survey, popularly called the Bressey Report, took three years to complete, and was prepared in consultation with Sir Edwin Lutyens. Both members of this team are in the news again ; Sir Edwin is chairman and Sir Charles vice-chairman of the R.A. Planning Committee (the "vista-mongers" see p. 289), whose scheme for London is on view at Burlington House. Born in 1874, Sir Charles was educated at Bremen, Rouen and Forest School, Walthamstow. He served throughout the last war (Lt.-Col., R.E.) and was made Chevalier Legion d'Honneur ; he is now a Battalion Commander in the Essex Home Guard. He was a member of the Allied Commission, Rhine Province Communications ; Divisional Road Engineer (London) of the Ministry of Transport (1919), Chief Engineer (1921-28) and principal Technical Officer (1935). Sir Charles is a past president of the Chartered Surveyors' Institution and Junior Institution of Engineers and a member of the Permanent International Commission of Road Congresses. He was knighted in 1935 and was made a C.B. in 1930, and a C.B.E. in 1934.

Architecture. When the war ends, therefore, Poland will possess a number of young and highly qualified architects immediately available to face the task of rebuilding their shattered country.

In this way a Polish School of Architecture, with its traditions and inspiration drawn from the mother schools in Warsaw, Lwow and Cracow, is being revived about 1,100 miles from its homeland on British soil at the oldest University School of Architecture in the British Empire. Both the staff and the students in Liverpool have warmly welcomed the prospects of close collaboration and friendship offered by the scheme, which will be officially inaugurated to-morrow, by General Sikorski, upon whom the Liverpool University is to confer the honorary degree of Doctor of Laws on the same day.

The President of BINC., Mr. R. Coppock, stated in his address to the Half-Yearly Meeting of the Council held last Thursday, that he was not satisfied with the measures taken in the matter of preparation for meeting the problems of immediate post-war reconstruction. The principal need of that time would be to get industry generally and the building

industry in particular working extensively and over a wide field.

"While Cabinets and Governments fail to give the country this necessary lead or to decide on a body of general principles, economic or otherwise, which will create such a lead, that lead," he said, "must be created by other agencies. The country of itself can, with the aid of its free institutions, prepare the ground, to some considerable extent, for meeting its own problems. Accordingly, it is proposed to cut across the tangle of interests, ministerial and otherwise, and prepare proposals on such vital matters as the redevelopment of sites where no practical or sane question of frontage or usage can reasonably arise and to present them, if necessary, to the Cabinet direct. Secondly, it is proposed to proceed with the drawing up of practical and clear-cut proposals for the means of prevention of and escape from Fire in Buildings. Clear-cut principles for dealing with these two primary matters will go a very long way in providing simple means for early commencement to be made on many sites calling for simple reconstruction. Such proposals will not interfere in any way with the consideration by Government and other interested bodies of the wider problems concerning those sites which call for major re-planning. The immediate need of the country is for some responsible body to consider the means whereby a commencement of building, perhaps especially of housing, could be made without injury to the country's interest, and I believe that no industry is more capable of doing this than is the building industry, acting as a whole, through the Building Industries National Council."

The Exhibition of UTILITY FURNITURE, *which has been running at the Building Centre for the past three weeks, closes next Saturday. The average attendance has been 3,000 persons per day.*

Bedroom furniture on view at the Exhibition of Utility Furniture at the Building Centre.

LORD REITH'S SPEECH

THE main burden of Lord Reith's recent speech reported in full in last week's JOURNAL, is that one man should be made responsible for national development: "the rest of the machinery is of less importance than that there should be one minister in general charge—a Minister of National Development." This demand for a single responsible minister has a familiar ring about it. As the need for direction by the State on a national scale has been realized in one sphere after another during the last thirty years, and as the objects to be achieved by it have become increasingly complex, the nineteenth century system of *ad hoc* departments has been found increasingly unsatisfactory. Each big advance has been preceded by a demand for a single responsible minister and, broadly speaking, until that demand has been met no great advance has been made.

A recent precedent—to quote one only—has been the appointment of Mr. Oliver Lyttelton as Minister of Production. His position is not unlike what that of a Minister of National Development would be. There are government departments of long standing whose work has a direct bearing on war production,—there are the Board of Trade, the Ministry of Transport, the Ministry of Agriculture, the Ministry of Labour and the Ministry of Mines—just to mention a few of them. To concentrate all the relevant executive powers in the hands of a single minister with a department of his own would be clearly impossible. Differentiation at the administrative level is necessary for order, if for no other reason. But to leave each of these important branches of the Civil Service to pursue its own policy within the limits laid down by law is equally impossible if progress is to be made in any direction. The view that a common policy can and must be worked out by the Cabinet as a whole has had to be abandoned in this and several other cases because experience has shown that the Cabinet is a totally unsuitable body to decide upon inter-departmental questions of a rather technical kind, and in any case has not the necessary time at its disposal to do so. Hence the demand for a single minister without precisely defined powers, charged with the task of seeing that existing executives pursue a common policy. The appointment of Mr. Lyttelton, frantically opposed for three years, has amply justified itself.

Physical Planning is a subject with as many ramifications as production. It affects every existing ministry and indeed every land user. The Ministry of Agriculture, the Ministry of Transport, the Ministry of Health, the Board of Trade, the Ministry of Education are all deeply implicated. It is generally admitted that all the relevant executive powers cannot be transferred to a Ministry of Planning. If they were it would become the only ministry—and still the actual work of drawing up and carrying out plans would be in other hands—in the hands of local authorities great and small.

Two alternatives lie open to the government. The ministry may remain what it is at present, an off-shoot of the Office of Works charged with the task of reconciling the diverse, continually changing and often contradictory instructions of other departments, and working out from them a coherent set of planning principles. The formulation of an understandable policy on this basis is clearly quite impossible. All such a ministry can do is to modify from time to time plans submitted to it by local authorities to avoid clashes of the worst kind. Opportunism is unavoidable under such a system and interference with local schemes, however necessary, is bound to be arbitrary and unpopular.

Or the ministry may be dissociated from the existing Government Department (left to deal with builders in the same way as the Ministry of Agriculture deals with farmers —a cut-and-dried problem large enough for a single department to handle) and placed on a footing comparable to that of Mr. Lyttelton, whose responsibility it is to work out a policy for co-ordinating the work of other ministers over a very wide sphere.

Clearly if there is a minister of National Development as described by Lord Reith, with power to formulate a physical planning policy related to our social and our economic needs, there is very little room for a second minister, a minister of planning, attached to a government department of the ordinary kind. Some machinery is wanted however to act as link between the policy of the minister, formulated in collaboration with other ministers and with the approval of Parliament, and government departments and local authorities, acting singly or in collaboration, in whose hands the drawing up and execution of detailed plans will remain. Discussion still rages about what form this machinery should take, and it is on the nature of this machinery that the present controversy chiefly centres. There are several reasons for thinking that a government department of the ordinary kind is not suitable for the purpose:—(i) there is the question of status; the Planning Commission or Central Land Control or whatever it may be called must have power to give final decisions on questions of detail affecting other departments, which implies that it should be something different from a mere department itself: (ii) men made responsible for this work need to be protected from political pressure exerted by interested parties: (iii) they need to have power to undertake research and offer advice based on technical considerations. Lord Reith's proposal has been attacked on the grounds that it would be undemocratic to give extensive administrative powers to a Commission not under the direct control of Parliament but the chief question at issue appears to be whether planning is to be based on (not dictated by) long term considerations of a technical kind, or whether the details as well as the general policy of planning are to be subject from day to day to the hazards of popular pressure and control.

The Architects' Journal

War Address: 45, The Avenue, Cheam, Surrey

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NOTES & TOPICS

ADAMANT FOR DRIFT

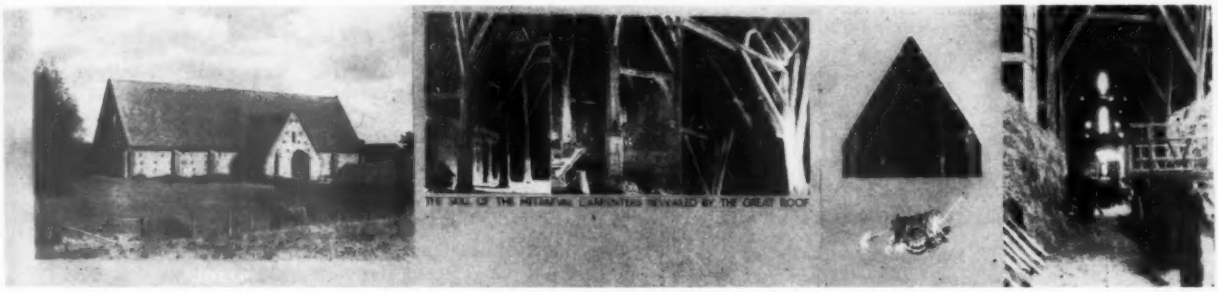
The soldier in grubby battledress had a *Times* which I had been coveting. Suddenly he slapped the paper down, caught my eye and exclaimed: "The Paymaster General is doing the reconstruction and now the Captain of the Gentlemen-at-Arms is in it. You'd wonder they don't burst out laughing at themselves!"

*

This was the first I heard of last Thursday's debate in the Lords, opened by Lord Reith, and after I had borrowed the paper I did some wondering, too.

*

As the war goes on assurances patter down on us from experts of the Right, Left and no party, that it will be possible after the war to retain full employment and obtain other badly needed things if—and only if—economic, social and physical redevelopment is centrally directed on a national scale through efficient machinery. It is not possible to tell now what particular measures, especially economic measures, will be needed to meet the post-war situation. But we do know the kind and scale of those measures, and therefore know enough to design the machinery which will be needed for their execution. And yet preparations for after-the-war are tinkered with, part-time, by the



Part of the screen devoted to Medieval England in the Englishman Builds *Exhibition at the National Gallery. This section shows illustrations of the Barn at Great Coxwell.*

Lord President of the Council, the Paymaster-General and now the Captain of the Gentlemen-at-Arms. All the public knows about these titles is that they are a gilded way of describing nothing. One can only feel that if our enemies were guilty of such ineptitude, the B.B.C. would never let them forget it.

★

Measures can be quickly prepared. The machinery cannot. Its design, involving as it does big changes in the authority of Ministers and local authorities, must be the subject of bitter dispute. But the consequences of postponing that dispute are likely on any showing to be far worse than facing it at once. The first year of peace will have its own disputes and no machine is the better for being designed when the opportunity of a century is being lost because it is not already working.

★

This is the issue which faces us now. Three years and two months of war have produced two reports which are far better than we have deserved; and if their recommendations were fully carried out this country would be in a fair way to being a pattern to the world. But the same three years and two months have seen virtually no progress made in preparing the machinery necessary for carrying them out, and questions repeatedly put to the Government have been answered only by quibbles and shuffles, which at last have become so casual as to be almost openly contemptuous. *The Times*—by no means an irresponsible and subversive publication—has stated that the publication of the Scott and Uthwatt Reports has removed the last excuse for postponement of action. To this the Government replied, in last Thursday's debate, by announcing that the Lord Chancellor had appointed a committee to enquire into one recommendation, amongst about a hundred, contained in one Report.

★

Time is growing short. We intend, so we are told, to win the peace as well as the war. When, five and six years ago, the Government of the day refused to make adequate preparation for waging this war, Mr. Churchill castigated them—and rightly—in strong terms. His "... adamant for drift ... resolved only to be irresolute" will always remain in our memories; it contributed substantially to raising him to his present position. We remember also his remarks when a Minister for the Co-ordination of Defence was appointed, with a typist and office boy, to tinker, part-time, with preparations to stop Hitler.

★

We have now about two years, according to Field Marshal Smuts, in which to prepare to win the peace, and we face a melancholy spectacle of a Government of which Mr. Churchill is now the head, telling us that a job at least as big as that we faced in 1937 is receiving the attention of the Paymaster-General with some assistance from the Lord Chancellor and other persons of grandiloquent title. To many of Mr. Churchill's admirers—not least to the architects and town planners, who support the establishment of a Central Planning Authority—this example of history repeating itself is inexpressibly painful.

★

THE ENGLISHMAN BUILDS

This exhibition, which was designed for the British Institute of Adult Education, the Army Bureau of Current Affairs, the Council of Music and the Arts, and all the rest, by Mr. Ralph Tubbs, should appeal to architects and laymen alike. To architects because the buildings illustrated are not on the whole well known—Mr. Tubbs had to hike 83 miles, he says, to view Great Coxwell Barn, and that was only the beginning of his search for photographs—and to laymen because the photographs are good and are allowed to tell their own story.

★

The story is that man builds as he does, because he is what he is. To illustrate this point there are six scenes, each showing a particular generation of builders at work. Each starts with the man himself; (this series of portraits is one of the nicest features of the exhibition), gives a scrapbook picture of his way of living, his materials and his tools; and ends with a series of photographs showing the building types he produces.

UTILITY FURNITURE

The Building Centre, whose removal to 13, Maddox Street, was announced on September 17, is now sufficiently well installed, according to the convention of the day, to stage an exhibition of utility furniture. Actually most of the exhibits are lined along a narrow gangway while workmen still possess the rest of the floor space, hanging their coats on shrouded exhibits and singing "O Solo Mio" to their own satisfaction.

★

Utility furniture is not as good as other utility products. It appears to be well constructed of sound timber—though the quality of the wood in pieces shown may be above

the average. Table tops are not made of cardboard or their legs of asbestos tubes, and the veneered hardboard that has been used for panelling is a satisfactory substitute for pre-war block board, if appearances are to be trusted, but that is the end of the good things one can say. Utility furniture may be finely made but it is very ugly to look at. In fairness to the panel appointed to advise the Board of Trade in this matter, it must be admitted that it has had unusual difficulties to cope with. Out of six architects suggested as designers with the necessary knowledge of the industry—a list including such names as Brian O'Rorke and Christopher Nicholson—all but two turned out to be in one of the Services and to have no wish to be released to design furniture for bombed-out families.

★

Materials presented similar difficulties. There was neither paint nor varnish to be had—only stain or wax; fabrics had to be chosen from an already existing stock of cheap durable materials; 1 lb. of springs had to be made to do the work of 7; production had to be localized to save transport, so that the few steam presses, for instance, which exist could not be called on to serve more than a small area; and hardboard, the only material available for panelling, had never been tested in use, and could not safely be used except in narrow widths.

★

To complete their difficulties the Committee adopted a three months time limit, feeling that bombed-out families could not be left longer without furniture of any kind.

★

It is said that these designs are not final. I hope this is true.

ASTRAGAL.

LETTERS

Charles Read

Pembroke Wicks, C.B., LL.B., Registrar, Architects' Registration Council

Architect

Post-War Housing

Sir,—The planning of the homes of our people is surely as important as the re-planning of our cities. Could not an exhibition be organized covering all aspects of post-war housing?

All interested parties should have the opportunity of submitting suggestions, and advance publicity should be given in the daily press to ensure the Forces being acquainted with the project, thus giving them the opportunity of expressing their views.

CHARLES READ.

Chorley Wood.

Architectural Registration

SIR,—The attention of my Council has been drawn to a letter* from Mr. Hugh Davies which appeared in your issue for October 8.

This gentleman applied for registration as an architect under Regulation 26 (2) of my Council's Regulations, according to which he had to prove that on August 1, 1938, he was an architectural assistant and had on that date been engaged in the study of architecture and the execution of architectural work for not less than seven years. His application was rejected by my Council on the Report of the Admission Committee, who were not satisfied that he complied with the provisions of the Regulation. At his request, on the submission of further evidence, the Admission Committee reviewed the matter, but saw no reason to modify their previous decision.

Since that date more than twenty letters have been received from Mr. Davies, and lately he has printed the words "registered architect" on his letter heading, apparently with the intention of challenging the Council to prosecute him for an offence under Section 1 of the Architects Registration Act, 1938.

To constitute an offence under that Section, it is necessary to prove not only that the defendant has been using the title of "architect," but also that he has been practising or carrying on business under that title. There is no evidence that Mr. Davies is practising or carrying on business, and there is therefore no ground for prosecution. Mr. Davies, in styling himself "registered architect," is making a statement which is demonstrably false.

PEMBROKE WICKS,
Registrar,
Architects' Registration Council

* *The letter reads as follows*—ED., A.J.

SIR,—For the past three years I have styled myself "architect," although refused admission to the Register. I have repeatedly informed the Registrar of my waywardness, but maybe my case defies repression, for I was discharged from the last war as an architect. I have registered for this war as an architect and now style myself "Registered Architect."

Catterick. HUGH DAVIES.

Architectural Students

SIR,—It would appear that Polish students are to be granted facilities which are denied to British students of Architecture.* The former have been given special leave by the Polish Army Authorities in order to complete their course at the Liverpool School.

Is this just "the thin edge of the wedge?" Will the same facilities be extended to other Allied students, such as, Free French, Belgians, Dutch, Norwegians, Greek, etc.

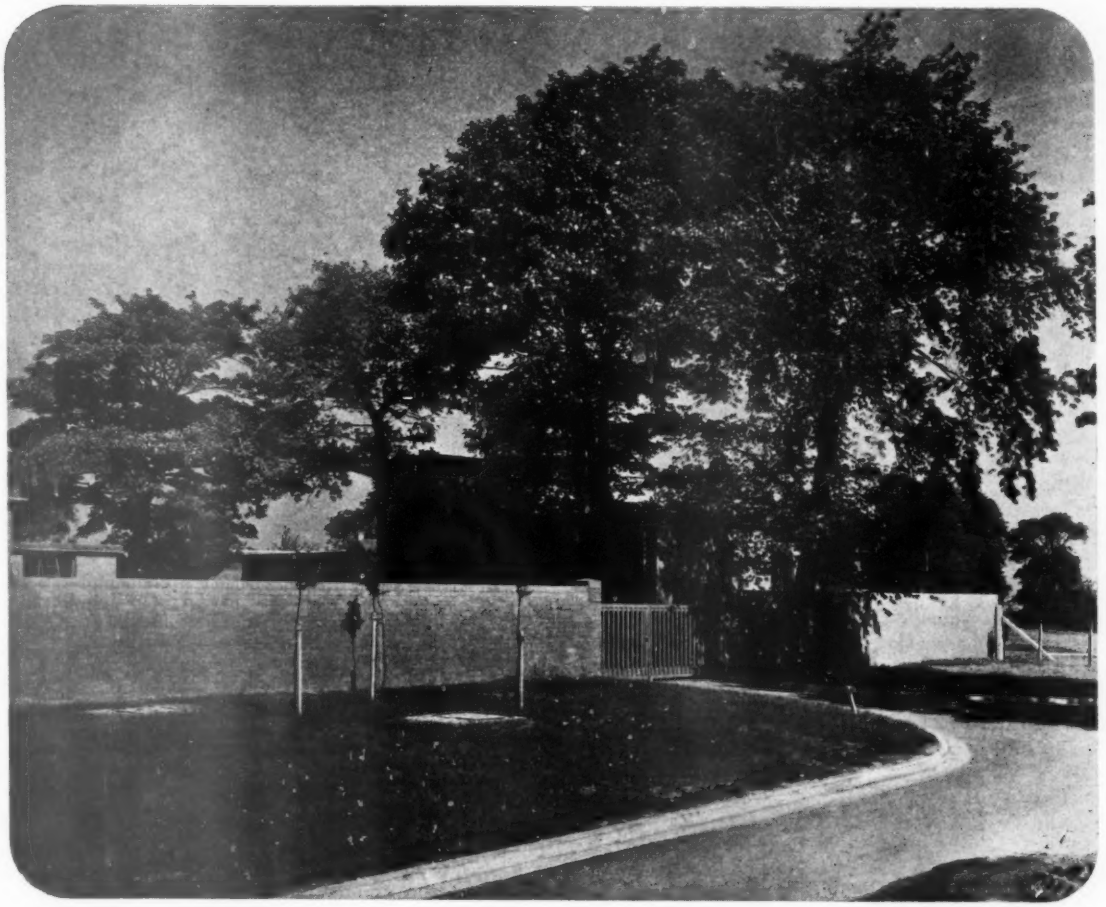
British students, upon reaching twenty years of age, have to cease studying at the School and are compelled to enter the Forces, unless they are unfit for service.

With regard to Polish students, the object at present is stated to be the provision of trained architects for the *reconstruction of Poland* after the War. But if the scheme is extended to include countries other than our own, is it not a fair assumption that when the time arrives for reconstruction to commence in this country, many of the alien students will be employed here and our students, who should be actively engaged in the great work, will be back at school, endeavouring to catch up.

ARCHITECT.

* *See page* 289.

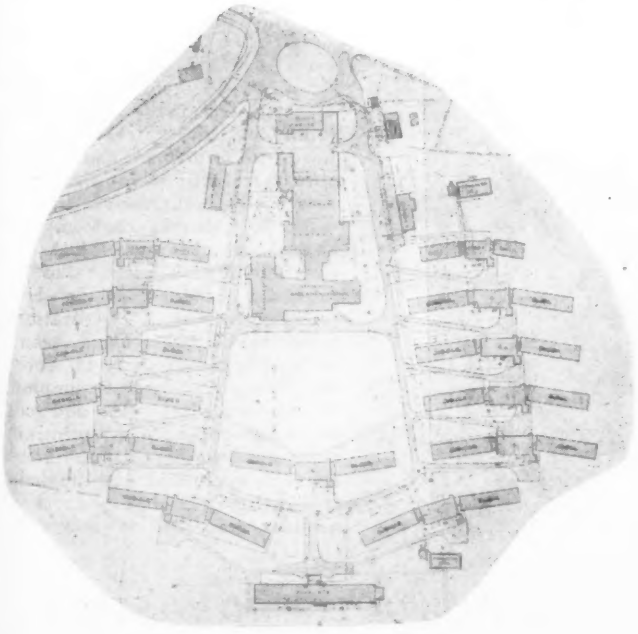
Screen three, devoted to the Grand Manner, in the Englishman Builds *Exhibition at the National Gallery*



Entrance to service yard.

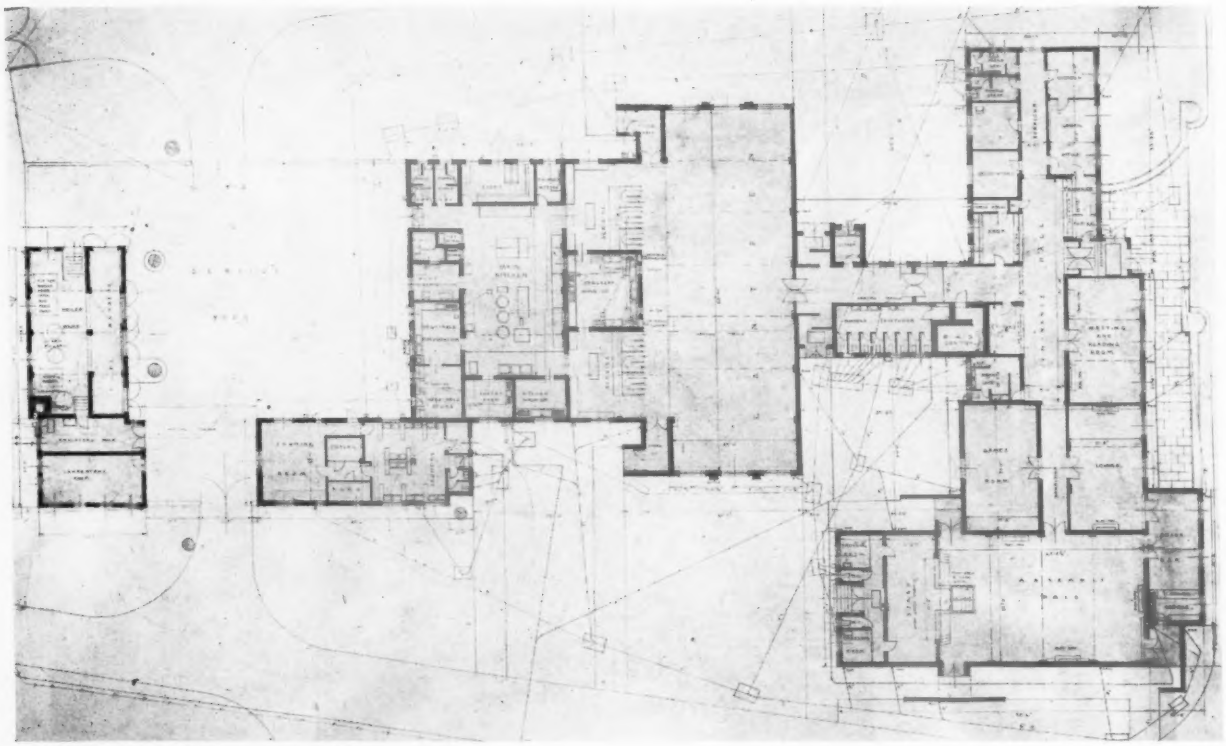
HOSTEL IN NORTH WALES

BY WOOD, GOLDSTRAW AND YORATH



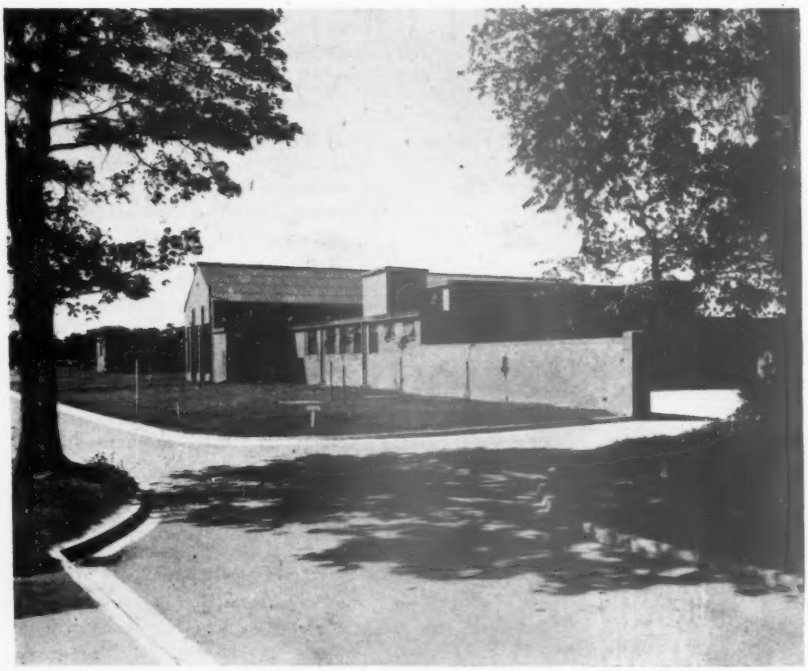
GENERAL—This hostel has been planned to accommodate 500 women workers. It comprises a welfare building, cubicle sleeping blocks—eleven for residents, and one each for the male and female staff—sick bay and gas decontamination centre, quartermaster's store and trunk store, hairdressing department, and two bungalows, one for the warden and a second for the two senior members of her staff. The first publication of any large-scale hostel accommodation was made in our issue for March 5. This consisted of living quarters and social welfare buildings, by Professor William Holford, on two sites in England. All the hostels, including that in North Wales, now illustrated and described, have been built for the Ministry of Supply by the Ministry of Works and Planning.

SITE—The buildings are grouped round the welfare centre and a grass campus which falls to the



Plan of welfare block, canteen, and boiler house.

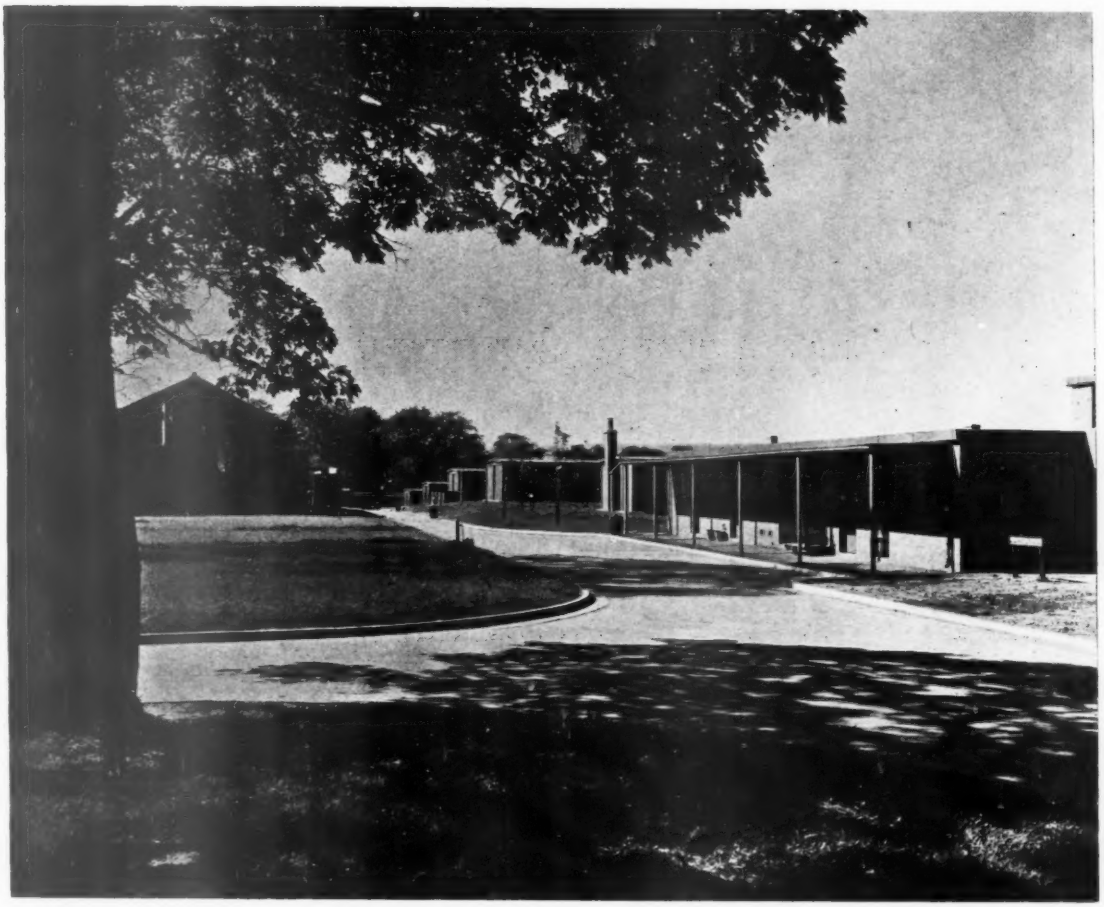
south-west. The long sleeping blocks are sited parallel to the contour lines, thus economizing in foundation work. The spaces between these blocks are used for growing vegetables, where they are unobtrusive, while the deep cultivation of the ground makes for ready absorption of rainwater, which might otherwise lead to surface accumulation. Care was taken to avoid cutting down any trees and hedges have been retained where possible. Further trees and shrubs have been, or are being planted.



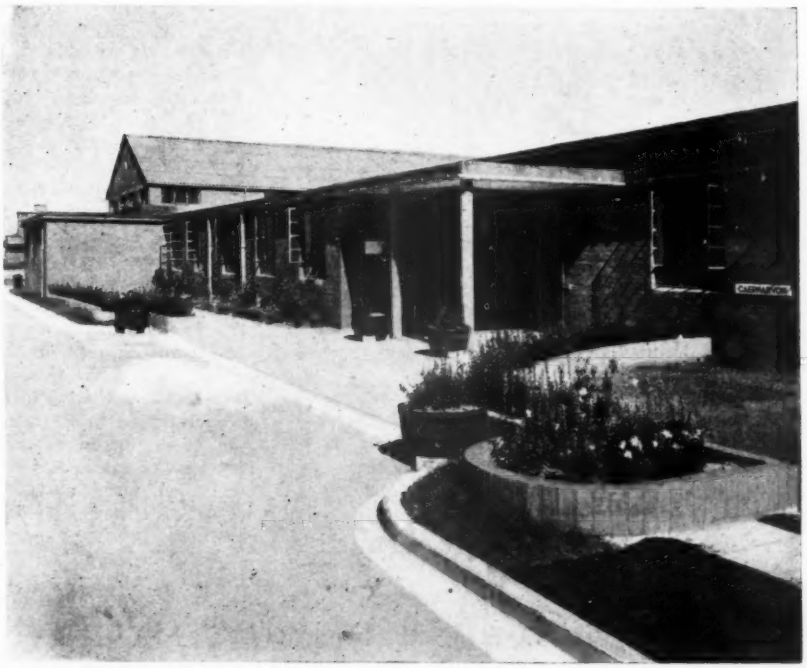
WELFARE BUILDING—This consists of administration offices, recreation rooms and snack bar, assembly hall, canteen, kitchen and offices, a small laundry, and boiler house.

CONSTRUCTION—Walls are brick with 11 in. cavity walls externally. Flat roofs are precast concrete unit slabs covered with bituminous felt. Pitched roofs are lined with fibre board and covered with corrugated asbestos. Floors are concrete with various finishes —red asphalte in canteen, and snack bar, Granwood blocks in assembly hall, quarry tiles in kitchen section and elsewhere smooth concrete. Decorations follow closely the scheme recommended by the Ministry of Works and Planning. A typical example is the canteen. Here walls and roof are cream, the floor, principal rafters and purlins and the band above dado are dark red, the dado is light grey and the doors a medium grey.

HOSTEL IN NORTH WALES. *BY WOOD, GOLDSTRAW*



Above: The quartermaster's stores, sleeping dormitories in distance and (on the left) rear of assembly hall. Below (left), the welfare block from the west and (right) the main entrance to the welfare block. Facing page: entrance to service yard and boiler house. The canteen block is on the left.



RESIDENTS' SLEEPING ACCOMMODATION—The cubicle sleeping blocks comprise an ablution block with P.A.D. shelter of normal brick and concrete construction, with cubicle wings on either side. The cubicle wings are of B.C.F. hut construction. (Progress photographs taken on this site were published in THE ARCHITECTS' JOURNAL for April 9.) In general the cubicles are single but double cubicles are provided in two blocks. In the ablution room the lavatory basins are separated by light partitions and

AND YORATH

The sick bay. Top, left to right: main entrance hall; assembly hall; reading room and writing room; canteen and dining room.

provided with rot-proof canvas curtains. It was found necessary to provide a common room in one of the cubicle wings.

STAFF ACCOMMODATION—Male and female staff sleeping blocks are provided similar to those already described, but divided into self-contained sections for higher and lower grade staff, each having their own common room. Two bungalows are also provided, one for the warden, and a second which is shared by the house administrator and canteen manager.

SICK BAY AND GAS DECONTAMINATION CENTRE—Walls are reinforced brickwork and the roof of reinforced concrete. The sick bay accommodation includes a six-bed ward and two small wards of two beds each, a self contained two bed isolation unit, dispensary, and consulting room and the usual ancillary accommodation. The decontamination centre is entered through an undressing space open to the air which connects through a gas block to a further undressing and decontamination room from which access is had to the shower room, and treatment and dressing rooms which lead into the sick bay unit.

SERVICES—Heating: low pressure hot water, each block having its own boiler. Cooking: gas and steam-heated ovens and boilers. Ventilation: fan extracts for the kitchen and assembly hall.

The general contractors were G. and J. Seddon Ltd.

For list of sub-contractors see page 304.

HOSTEL IN NORTH WALES.

BY WOOD, GOLDSTRAW AND YORATH

The first and second of a series of lectures on Scientific Building, organized by the R.I.B.A. Architectural Science Board, were held at the Institute last month. The two lectures on "Foundation Design" are printed in full on this and the following three pages; details of the other lectures appear on page 303. The series is to be resumed early in the new year.

SCIENTIFIC BUILDING

LECTURE 1.

[BY A. W. SKEMPTON]

Introduction

It is not necessary to emphasize the importance of foundations. With good foundations, no trouble will be experienced during the life of the building, but with badly designed foundations there will be cracking of plaster, cracks in the structure itself, and sooner or later, the expensive and awkward operation of underpinning may have to be carried out.

It will be my task to outline very briefly some of the more useful discoveries which have been made in the field of foundation engineering during the last few years. Let us say since about 1920, for it was about then that soil mechanics was started. Now I want to make it quite clear that I appreciate all the fine work which has been executed before this date. But there have been occasional failures; and the better men in a profession develop an intuition which is their guide. But certain principles have been found which will help all of us to make a sound job of the foundations; and particularly are these principles of use on new sites and with exceptional structures when precedent is lacking. It is, for example, probable that there will be a tendency in the future for buildings in cities to be higher and this will impose greater loads on the foundations.

Soil Types

The chief foundation troubles arise when we encounter soils such as clays, silts or sands. The clays and silts can be treated as a group which has a low bearing capacity and which continue to settle under load for years after a building has been completed (see Fig. 1). The sands and gravels form another group which are more stable and which do not continue settling after construction, but which may cause difficulties in excavation, especially if they are water-bearing.

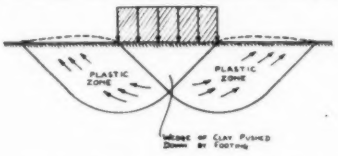
The danger here is that when excavating it becomes necessary to pump in order to keep the bottom dry, and this pumping may bring out some of the finer particles in the surrounding sand, leading to settlements of any adjacent buildings. An elegant solution of this problem is provided in the process of ground-water lowering from filter wells. The question of sands may perhaps be summarized by saying that it is difficult to get the foundation in position, but when finished, little further trouble may be expected. The case is entirely different with clays. Speaking generally, it may be said that the troubles start after the foundations have been completed; and for that reason, most of my remarks will apply to clay.

Footings on Clay

One of the commonest troubles with clays is their shrinkage and expansion in the summer and winter. These can cause considerable movements in the clay beneath shallow footings; the clay on one side of the building will either dry or swell more rapidly than on the other side and relative movements in the walls will be the result. The movements are seasonal, and they can be prevented by taking the footings to a depth which is not affected by seasonal changes to any important extent. Such a depth is roughly 3 ft. in England, and this is also sufficient to guard against frost action.

With houses on sloping sites in clay soils a second point must be considered. For it is an unfortunate fact that clay tends to creep downhill, and footings must, therefore, be deep enough to be below the zone of this movement. In the London area there are examples of houses cracking, due to this cause, even when their footings are 3 ft. or 4 ft. deep. A possible remedy is to place the building on reinforced concrete strip footings, supported at intervals by piles about 12 ft. long. These could be bored piles, the boring being made with a hand post-hole auger.

In the case of houses the above considerations may be all that is necessary. But for larger structures, the bearing capacity of the clay must be taken into account. If the load on a footing is progressively increased, a point is reached at which the clay beneath the footing fails completely and the footing settles rapidly. The mechanism of failure is shown in Fig. 2,

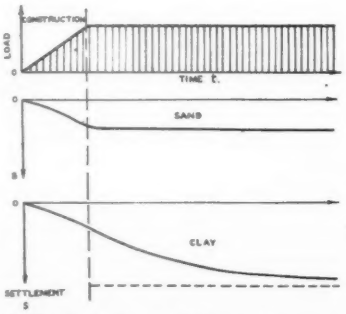


2. *Diagram illustrating mechanism of failure in shear beneath a footing.*

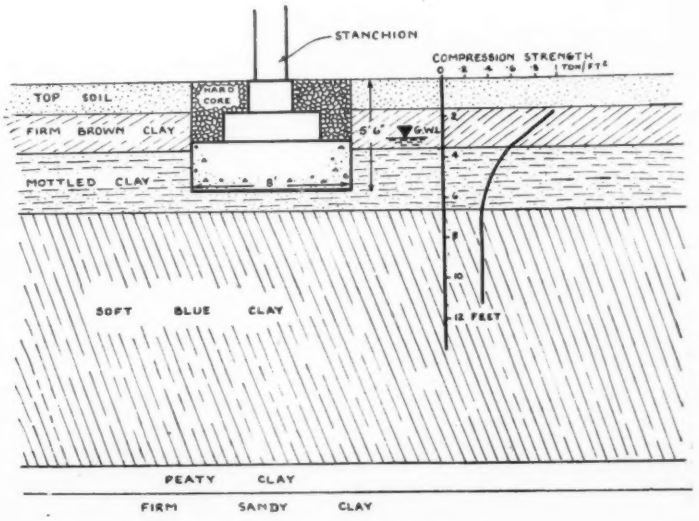
and it is important to notice that the clay is sheared to a depth roughly equal to the width of the footing.

It is known that the ultimate bearing capacity, i.e., the pressure causing a failure, is approximately equal to three times the compression strength of the clay. Thus if the compression strength of a clay is found to be equal to 1 ton/sq. ft. the load which would cause a failure of this clay is about 3 tons/sq. ft. To find the bearing capacity we therefore take samples either from a boring or a trial pit to a depth below the footing equal to its width and measure their compression strength in much the same way as one would make a concrete cube test. This procedure is simple and can be carried out on the site. It has been checked by investigating the failure of a footing founded on a soft blue clay, Fig. 3. The compression strength of the clay was found to be ¼-ton/sq. ft. and the calculated bearing capacity was, therefore, 1 ton/sq. ft.—a value in close agreement with the load actually on the footing at the time of failure.

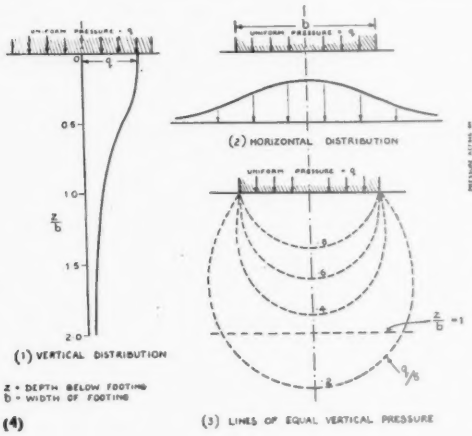
The depth of sampling deserves to be emphasized. In this example the clay became very appreciably stronger as the surface was approached, and had an estimate of the bearing capacity been made from an examination of the surface clay, with a possible

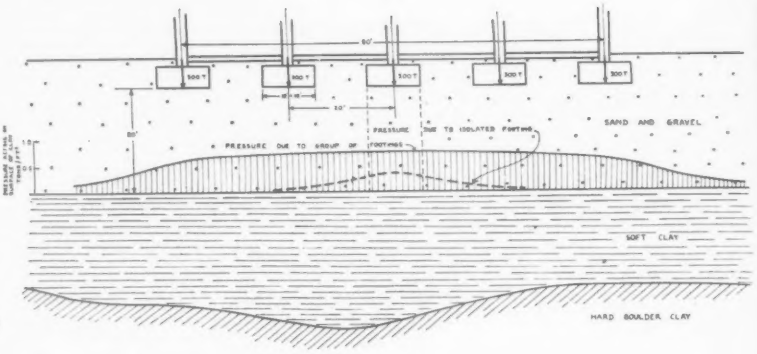


1. *Typical time settlement curves.*



3. *Soil condition at the site of a footing failure.*





5. *Distribution of vertical pressure on a clay layer beneath the centre line of a building which is square in plan.*

4. *Distribution of vertical pressure under a uniformly loaded square footing.*

assumption that the clay became stronger with depth, that estimate would have been sadly wrong.

Now, so far we have been considering the ultimate bearing capacity of clay soils. The allowable capacity is, however, the value required for design. This allowable bearing capacity may be defined as the ultimate divided by a certain factor of safety. This is not a factor of ignorance but is a factor used to keep the loading well below the ultimate and thus to keep the settlements within reasonable limits. The value of the factor depends to some extent on the type of building. In order to understand this point, consider a building founded on a series of isolated footings. The proportioning of the load on these could be done with great care, and yet the natural variations of the clay beneath the footings will, in general, cause the settlements to be unequal; and there are, therefore, relative movements between the various footings. It is, of course, obvious that if the proportioning of loads is not carried out with care, the relative settlements will be greater.

It is these relative settlements which cause a great deal of trouble by cracking walls and plaster and by overstraining a monolithic frame. They must be kept to a minimum and they must be taken into account, where necessary, in the design of the superstructure. Mr. Hausser will deal with this question, but I must refer to the factor of safety. Other things being equal, we can say that the less the settlement of the individual footings, the less relative movement between them. To keep the settlements small and, therefore, to keep the relative settlements small, an adequate factor of safety must be applied to the ultimate bearing capacity, and as a rough guide it may be said that a factor of 2 is suitable for most buildings, and a factor of 2.5 or 3 for buildings particularly sensitive to settlement. Thus if the ultimate bearing capacity was found by test to be 3 tons/sq. ft., the allowable should be between 1.5 and 1 ton/sq. ft. depending on the type of structure. More field observations are required on this very important question.

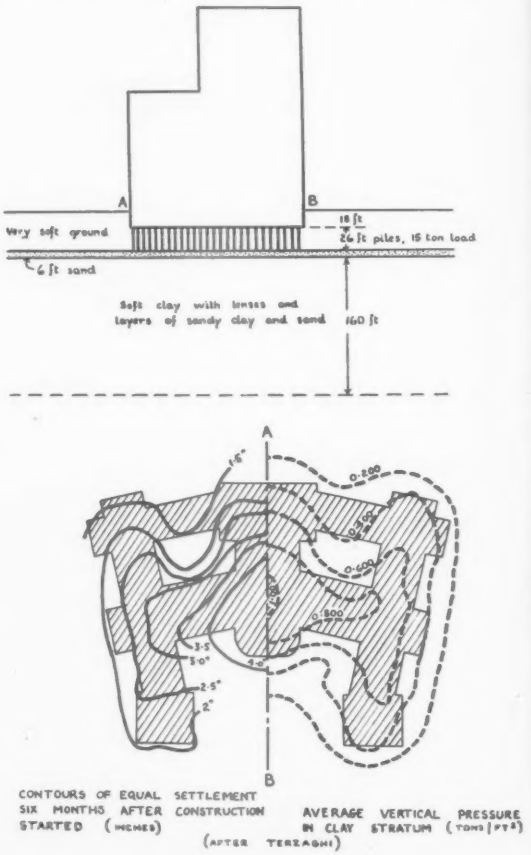
If the footings are moderately close, there is another factor which must be watched. The pressure from a footing is spread out in the soil and decreases with increasing depth, see Fig. 4. If there is a group of footings, the pressure at any depth, as for example on the clay layer in Fig. 5, will be the result of combining the pressures spread out from each of the footings. Thus, although the pressure from any one footing is quite small, the combined pressure is considerable, and the clay will consolidate. The process of consolidation is simply that of squeezing out of the clay some of its pore water (into the adjacent sand) and thereby causing a reduction in volume and a settlement. Here again, the settlements will not in general be uniform over the whole area of the building and some relative settlement must be expected. It should also be realized that the consolidation is a slow process and will continue for some years after construction has been completed. The settlement can be estimated within certain limits of accuracy, but this is rather too technical for discussion here.

The chief point to notice is that the clay layer in Fig. 5 is of concern in the foundation design, even although it lies at a good depth below the footings, and in spite of the sand having, for example, a high bearing capacity. This illustrates the importance of knowing the nature of the strata to a depth below a building at which the combined pressures have become negligible. It may be said that no intelligent foundation design is possible without knowing the nature of the soil to an adequate depth below the footings.

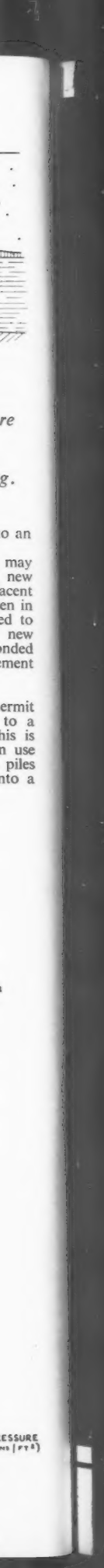
Another case where relative settlements may be of importance is that in which a new building is constructed immediately adjacent to an old one. A building which has been in position for many years may be assumed to have taken up its settlement; but the new building will inevitably settle, and if bonded into the old building the relative movement may cause cracking.

Bearing Pile Foundations

If the soil is not sufficiently good to permit isolated footings, it is usual to turn to a consideration of piled foundations. This is the classical solution which has been in use since at least Roman times, and if the piles can be driven through the poor soil into a



6. *Section and settlements of the Charity Hospital at New Orleans.*



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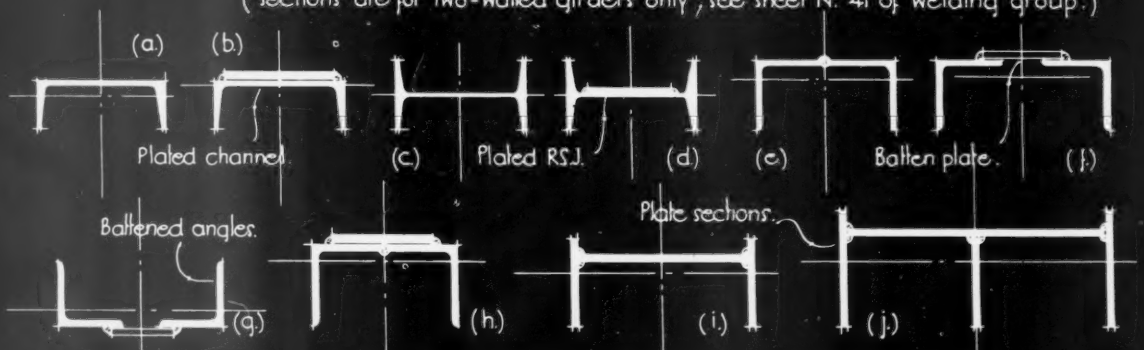
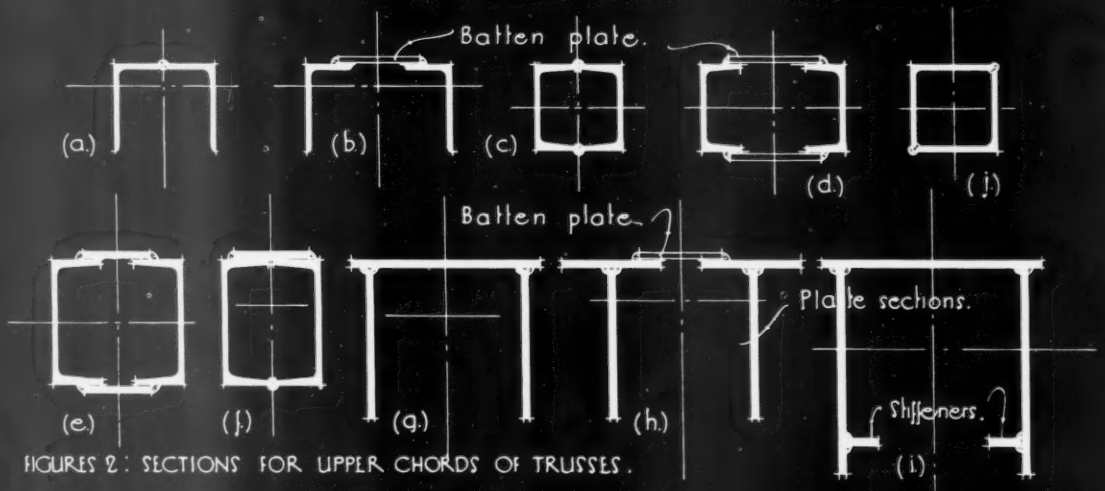
DETAILED CONSIDERATIONS OF DESIGN IN WELDED STEEL 15 : LATTICE GIRDERS (b):

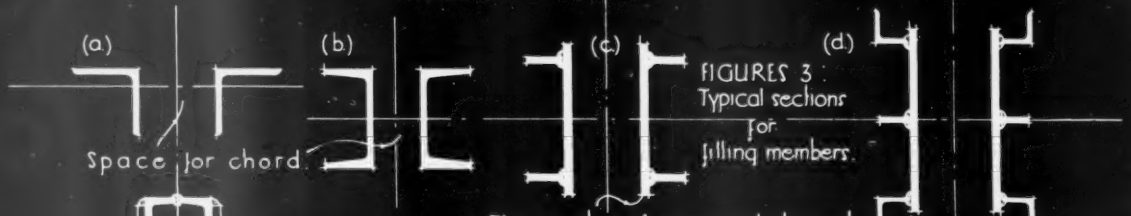
(Sections are for two-walled girders only, see Sheet N° 41 of welding group.)



FIGURES 1 : TYPICAL EXAMPLES OF SECTIONS FOR LOWER CHORDS OF TRUSSES.



FIGURES 2 : SECTIONS FOR UPPER CHORDS OF TRUSSES.



FIGURES 3 : Typical sections for filling members.

This member of compound channel sections is butt-welded to webs of chords.

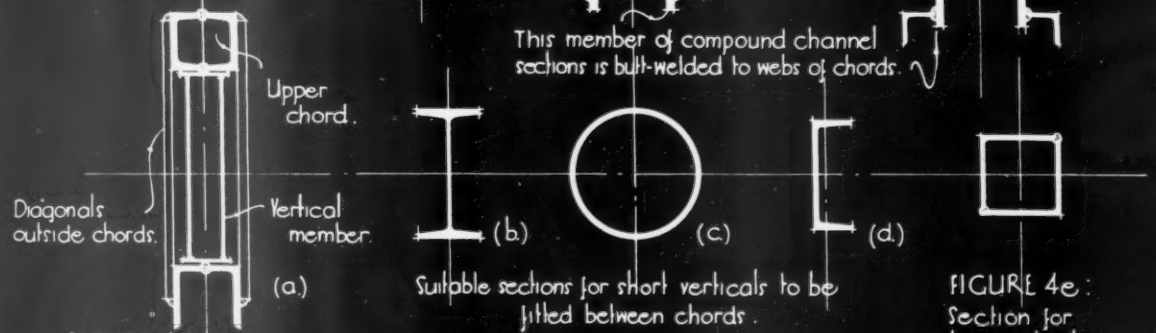


FIGURE 4 : VERTICALS FITTED BETWEEN CHORDS.

Suitable sections for short verticals to be fitted between chords.

FIGURE 4e : Section for long vertical infilling.

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INFORMATION SHEET

• 883 •

STRUCTURAL STEELWORK

Subject : Welding 42 : Detailed Considerations of Design in Welded Steel 15 : Lattice Girders (b).

General :

This series of Sheets on welded steel construction is a continuation of a preceding group dealing with riveted and bolted construction, and is intended to serve a similar purpose, namely, to indicate the way in which economical design as affected by general planning considerations may be obtained.

Both the principles of design, and the general and detailed application of welded steelwork are analysed in relation to the normal structural requirements of buildings. The economies in cover and dead weight, resulting from the use of lighter and smaller steel members and connections, are taken into consideration in the preliminary arrangement of the building components in order to obtain maximum economy in the design of the steel framing.

This Sheet is the fifteenth of the section on detailed considerations of design in welded steel, and is the second of two Sheets dealing with useful sections for chords and diagonals of lattice girders and trusses.

Sections with Two Webs :

Lattice girders having two vertical webs or flanges were shown in principle in Fig. 2 of Sheet No. Welding 41. The variety of forms such girders may take is practically unlimited. The sections of which they are formed are themselves fairly stiff laterally, and no additional material is required for the sole purpose of providing lateral stiffness. Sections of this type may also consist of two members placed some distance apart, but the use of this arrangement requires careful consideration since any apparent advantage may be more than offset by the extra material and labour involved in providing the necessary batten plates.

Lower Chords :

Figure 1 shows suitable sections for a lower chord. In Figure 1a a channel is shown which can be plated in some panels, as indicated in Figure 1b. This channel might be replaced by an R.S.J. (Figures 1c and 1d) or by two equal or unequal angles, which in turn can be arranged either with their edges in contact, or with a space between them. The angles can also be plated. See Figures 1e, f, g, h.

For heavy girders, sections made up of plate might be given preference. See Figure 1i and j.

Upper Chords :

For upper chords the type of section can be the same as that used for the lower chord, for instance, two unequal angles plated toe-to-toe, or a slight distance apart. Figures 2a and 2b. For any appreciable forces two channels are preferable, usually placed toe-to-toe, as in Figure 2c, but sometimes with a space between (Figure 2d) in which case batten plates must be added. These channels can be plated top and bottom, or on one side only (Figure 2e and 2f).

For heavy construction compound plate sections are used. They should be open at the bottom (Figure 2g) or split into two Tee sections (Figure 2h). If the depth of the web is increased too much, stiffening plates, which may be considered as part of the section, may be necessary as in Figure 2i.

Filling Members :

Filling members are, for the most part, fixed to the outside of the upper and lower chords, which should be of equal width. They may consist of two angles (flanges outwards), or two channels. See Figures 3a and 3b. In heavy construction they can be replaced by two compound channels or similar sections : Figures 3c and 3d. In the latter case the main plate would be butt-welded to the webs of the chords. In lattice girders with parallel chords, it is possible to attach the verticals, not on the outside as in the case of diagonals, but between the upper and lower chords. See Figure 4a. In this way the connection between the chords and the verticals is separated from that between the chords and the diagonals. When arranged in this way, short, light vertical members can consist of an R.S.J., a tubular section, or a channel, see Figures 4b, c and d.

For long members, however, two angles, toe-to-toe, or two channels, arranged in the same way, would often be more satisfactory. Figure 4e.

Previous Sheets :

Previous Sheets of this series on structural steelwork are Nos. 729, 733, 736, 737, 741, 745, 751, 755, 759, 763, 765, 769, 770, 772, 773, 774, 775, 776, 777, 780, 783, 785, 789, 790, 793, 796, 798, 799, 800, 801, 802, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 816, 819, 821, 822, 823, 824, 826, 827, 828, 830, 832, 836, 837, 838, 839, 840, 842, 843, 845, 847, 848, 849, 850, 851, 852, 853, 855, 856, 857, 859, 860, 862, 863, 865 revised, 867, 869, 870, 871, 874, 875, 877, 880 and 882.

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firm stratum, the solution is perfectly satisfactory.

This constitutes a bearing pile foundation, and the piles act merely as columns carrying the structural load down to the firm stratum. But it is essential to prove the soundness of this stratum. An example of the neglect of this principle is provided by the Charity Hospital at New Orleans, see Fig. 6. Here the piles were driven to refusal in a layer of sand; but the sand was only 6 ft. thick, which is negligible compared with the width of the building. So the building suffered heavy and continued settlements due to the consolidation of the underlying soft clay, and remedial measures had to be adopted. The important point to realize here is that the load from one pile is quite small, but the load due to the group is large, and will influence the soil to a far greater depth than will that due to one pile.

Friction Pile Foundations

If there is no firm stratum at a reasonable depth, the bearing pile foundation becomes impracticable, and two alternatives are left. Firstly, the friction pile foundation, and secondly a concrete raft.

The problem of friction pile foundations is a controversial one, at least in clays and silts. If a soil is a rather loose sand, there is much to be gained by piling, since the vibrations tend to compact the sand and increase its bearing capacity. Of course there are cases where the vibrations are harmful to adjacent buildings, as at the Port of London Authority building where pile driving had to be stopped as the vibrations were spoiling the port wine in the cellars of Trinity House.

In clays, however, the pile driving tends to break down their delicate micro-structure and makes them softer. For this reason among others, some engineers view the whole question of friction piles with disfavour.

Whatever the general efficiency of this type of foundation, the piles must certainly be of a length comparable with the width of the building. For observations have shown that the settlements of buildings in Shanghai, see Fig. 7, are roughly proportional to the pressure at the base of the pile points, and it is clear that the longer the piles, the greater the reduction in pressure due to the spread of the building load. Short friction piles are not usually worth driving since the reduction of pressure due to the spread is insignificant.

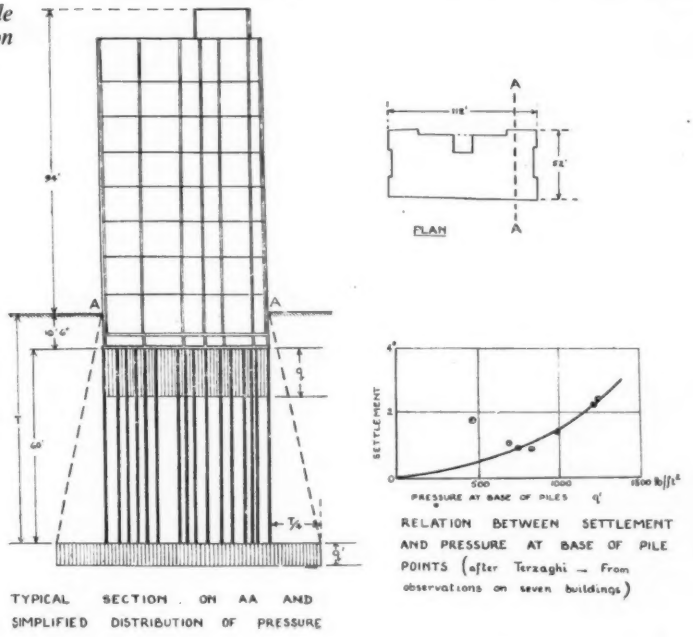
Raft Foundations

A raft foundation spreads the load of a building over the whole plan area, and therefore reduces the foundation pressure to a minimum. The raft is particularly effective if combined with a deep excavation; for if x tons of soil are removed from an excavation, it is possible to add a building load of x tons to a raft placed over the bottom of the excavation without setting up any additional stresses in the soil. The building load can be increased beyond this value by an amount equal to the allowable bearing capacity of the soil.

Let us take as an example the blue London clay. This has an allowable bearing capacity of, say, 3 tons/sq. ft. and 18 ft. of it exert a pressure of 1 ton/sq. ft. If, therefore, we excavate a hole 18 ft. deep, it is permissible to place a load of 4 tons/sq. ft. on a raft placed in the excavation. Since a building of the usual moderately heavy type weighs no more than 0.2 ton/sq. ft. per storey, it is seen that a 20-storey building could be built on the raft (provided that, of course, the raft is strong enough to withstand the stresses imposed on it). It is of interest to note that recent work on daylighting, indicates that this is a desirable height for buildings for population densities likely to occur in London. This height has, in fact, been exceeded in the tower of the London University building, which is on a concrete raft about 30 ft. below ground level.

An important practical point arises in large excavations in clay, and it is that the clay should be covered with the concrete as soon as possible after being exposed. Clays can soften and expand very quickly when relieved of a previously existing pressure.

7. *Friction pile foundation on Shanghai.*



Conclusions

The general conclusions may be summarized thus:—

1. In cases where precedent is lacking, intelligent foundation work can be carried out only with a knowledge of the soil to an appreciable depth below foundation level. This knowledge should include some quantitative data on the soil properties, such as the compression strength of a clay.

2. The cause of most troubles due to inadequate foundations is relative settlement. Every endeavour must be made to keep this to a minimum: and where necessary, provision must be made in the superstructure to allow for some relative settlement.

LECTURE 2.

[*BY P. C. G. HAUSSER*]

The object of any foundation is to support the load of the structure over, without any settlement or movement of sufficient magnitude to be detrimental to the safety or appearance of the superstructure.

Since the ground on which the foundation rests is generally of a relatively compressible nature, except in such special cases as hard rock, it must be anticipated that some settlement of the foundation will occur as the construction of the superstructure proceeds, and for some time after the completion of the building, when the latter is founded on clay soils.

The problem is therefore to select a type of foundation and so design it that (*a*) the total settlement of the building as a whole is not excessive, and that such settlement as may be expected should be even and uniform, and (*b*) that no appreciable *relative* settlement occurs between different parts of the building. It is usually this *relative* settlement that causes trouble and leads to cracking of walls and floors and straining of the framework in framed buildings.

Before a suitable type of foundation can be selected and its design started, it is necessary to have full information about the ground upon which the foundation is to be placed, and for a considerable depth below the foundation level. This has already been referred to by Mr. Skempton.

Various methods are used for obtaining information as to the character of the soil, and for arriving at an estimate of its safe bearing capacity. The "safe" bearing capacity may be defined as the "ultimate" bearing capacity (i.e., the pressure at which settlement will continue without appreciable increase of load), divided by a suitable factor of safety.

The factor of safety to be used in any particular case depends upon the type of structure and its importance, and the character of the loading.

Some of the more commonly used ways of ground testing are as follows:—

(1) By digging trial pits and inspection of the ground at foundation level.

(2) By loading tests carried out on small areas.

(3) By trial borings to determine the character of the soil to a considerable depth below the proposed foundation level.

(4) By carrying out simple field tests on undisturbed soil samples, such as the field compression test to determine the ultimate bearing value of the clay soil, and by laboratory analysis of the samples, when more detailed information of the properties are required for use in the estimation of probable settlements.

(1) Trial pits should be carried down at least as far as the deepest foundation on the site. They yield much valuable information as to the types of strata likely to be encountered in carrying out the work, and level of standing ground water, and so are of great assistance in enabling the engineer to design the work so that it can be executed by the contractor, and enable the latter to prepare his tender with a knowledge of the conditions which he will have to deal with in carrying out the work.

To estimate the safe bearing capacity by inspection of the bottom and reference to some tabulated values specified in building regulations for soil alleged to correspond with that in the trial pit, may lead to serious consequences, since it takes no account of the underlying ground, or of the size and type of foundation or character of the building, all of which have an important bearing on the allowable pressure that should be adopted in the design.

The ultimate bearing capacity of the ground at the bottom of the trial pit may be determined by loading tests or field tests on undisturbed samples.

(2) Bearing tests are carried out by applying a load to a bearing plate on the ground at foundation level, and recording the settlement and behaviour under increasing load.

The shape and size of footings have a considerable effect on the safe bearing pressure

and total settlement. Bearing tests should preferably be carried out on plates of similar shape, but of two or more sizes, so that an indication of the relationship between size and settlement can be estimated.

On clays and silts which have very fine pores, settlements continue over long periods, in some cases many years, so that settlement figures obtained from loading tests of an hour or so do not give reliable information. The results of bearing tests can only be applied to full size " footings " if the soil is uniform to a considerable depth below the footing.

Information obtained from either trial pits or bearing tests must always be correlated with a knowledge of the ground conditions to a considerable depth below the foundation level (up to 1½ times width of building). This information may be obtained from geological survey maps, artesian well borings, trial borings, or adjoining excavations.

The importance of this is illustrated by an example in which a layer of ballast 7 ft. thick is shown overlying a thick bed of soft clay. The bulb of pressure for the loading test lies wholly within the ballast and a good test result would be obtained with very little settlement.

For the actual foundation the bulb of pressure extends well into the soft clay layer, and if this foundation was designed on a safe bearing value, as estimated from the loading test on the ballast, serious settlements would be expected.

(3) The value of trial borings carried out with apparatus such as that used for in situ concrete piles, is much diminished by the fact that owing to the large amount of water used and the breaking up of the soil, the samples obtained generally bear little resemblance to the ground in its natural undisturbed condition.

They do show, however, whether the ground is uniform or variable, and indicate the presence and approximate thickness of such strata as gravel, sand, peat, clay of various colours, and to some extent degrees of hardness, and so give some indication as to the probable level at which a foundation can be obtained, and give a guide as to what further method of testing is desirable in order to arrive at a satisfactory foundation design.

Such borings should always be carried to a depth considerably in excess of that at which it is anticipated that a suitable foundation can be found, and if carried out in a logical manner and in sufficient numbers, they enable sections to be drawn across the site showing the depth, direction of dip and thickness of various strata and standing ground water level, and so can be of great assistance in the preparation of correct foundation drawings.

Time and money spent in exploratory work of this nature is well repaid in time, money and avoidance of disputes, when it comes to the carrying out of the work.

(4) A scientific development of the above consists in taking undisturbed samples of the soil at several different levels, and by testing these and applying the principles of soil mechanics, estimates can be made of the safe bearing capacity and the rate and amount of settlement according to the type and size of foundation adopted.

Since in any foundation the natural tendency is for some relative settlement to occur, consideration must be given to the character of the superstructure, and a proper appreciation formed of the magnitude of any foundation movements that could be permitted without cracking of the walls or straining of the framework, and the design of the foundations and superstructure handled accordingly.

For example, in a light single story steel framed building of the shed type, covered with corrugated sheeting, small movements of the foundations could occur without any deleterious effects, whereas in a monumental type of stone-faced building any appreciable movement between different parts of the structure would lead to serious cracking.

Types of Foundations.

The following foundation types are commonly met with in building construction :—

(1) Isolated bases and strip footings.
(2) Combined bases and cantilever bases.
(3) Rafts.
(4) Piled foundations.

Isolated and strip footings are probably by far the commonest type, and are economical whenever ground with a satisfactory bearing value can be reached at a reasonable depth below the lowest floor of the building.

Combined and cantilever foundations are special cases of isolated bases in which, owing to the close proximity of adjacent column loads, the isolated bases merge into one another, or where owing to the restrictions imposed by property lines on the bases to external columns, these foundations have to be tailed down by combination with an internal column foundation.

Where the safe bearing capacity of the ground is low, it may be necessary to spread the column loads over the whole area of the site, in which case a raft foundation is used.

All the above types transmit the load to the ground immediately below the foundation, which in turn transmits the pressure to more deep-seated layers.

In a piled foundation the load is transmitted directly by the piles to ground layers, which may be at a considerable depth below the foundation surface.

Piles may act as " Bearing Piles " in which the load is transmitted by the pile acting as a column directly to a hard stratum at some depth below the foundation surface, or as " friction " piles in which the load is supported by the friction of the soil on the sides of the pile. Generally in practice piles act partly as bearing piles and partly as friction piles.

Whatever type of foundation is adopted it is necessary when proportioning the size of the bearing area under individual columns to consider the proportions of live and dead load that the foundation will have to support.

Clearly as regards failure, the full live and dead loads must be carried without exceeding the ultimate bearing capacity of the ground.

Since settlements take an appreciable time to occur, the important loads for settlement are those which are always present, such as dead load, and that portion of live load such as fittings, furniture, books, stores, machinery, etc., which remains more or less permanently in place.

For instance, in buildings such as offices, light workshops, public halls, etc., where the live load consists mainly of people and light movable fittings, the base areas may be so proportioned that those carrying mainly dead load have normally a lower ground pressure than those in which a large proportion of the load is live load.

One recommendation* for this type is so to design the area that the intensity of pressure under each footing is equal for dead load + ¼ live load.

This applies to buildings of the office type.

In the case of the R.I.B.A. building in which we are now, the foundations are founded on blue clay by concrete piers carried through the overlying ballast.

The foundations are designed to allow of two additional stories in the future. The areas of bases are designed to give equal pressure under all bases for (dead load + ¼ live load) under maximum future loading conditions of 3.2 tons per square foot. The maximum intensity under any base for full live load + dead load is 3.8 tons per square foot.

In warehouse buildings where materials may be stored for considerable periods, the areas should be proportioned to give equal pressure under full live and dead loads on all footings, or such proportion of live to dead as appears reasonable for the usage of the building.

Light buildings of the shed type require a different treatment, as loads from wind and movement of cranes form an appreciable percentage of the dead load which is usually small, and the foundations are also frequently designed to resist considerable bending moments, and each case must be decided on its merits.

* Jacoby & Davis. Foundations of Bridges and Buildings. 3rd Edition, page 407.

To keep settlements within reasonable limits, the actual pressure between the footing and the ground must be kept well below the ultimate bearing capacity, say a factor of safety of 2 to 3 according to the character and importance of the building, as already mentioned by Mr. Skempton.

Live loads which only occur intermittently and for short periods have little effect on settlement, and for the total load, which includes the full live loads, it is tentatively suggested that a smaller factor of safety, say about 1½, can be used.

Wind loads also form a " live load," but except in the case of tall narrow buildings the effect on the foundations is small and may usually be neglected.

Similar considerations apply to the design of spread and raft foundations in which, although some small settlement is to be expected, every endeavour should be made to keep this uniform.

When column loads on rafts are very unequal it becomes difficult to make the raft sufficiently stiff to spread the loads from the more heavily loaded sections to those more lightly loaded.

This has given rise to foundations in which the lowest floor, intermediate basement floors, and framing and retaining walls are designed to act as a cellular box of great stiffness.

A further interesting type of foundation for use on poor ground, which would appear to have interesting possibilities, is the use of a concrete box under the columns, instead of solid bases. This, while being light, is capable of giving a large spread, the underlying idea being that if the bearing pressure can be kept down to something very little greater than the weight of ground displaced by the box, the stress conditions in the underlying soil remain practically unchanged, and no settlement should occur.

The above are precautions in the design of the foundation proper, to avoid trouble from relative settlements.

There remain precautions which can be taken in the design of the superstructure to minimize the effect of relative settlements.

Various types of superstructure exhibit different degrees of sensitiveness, and grading from the least sensitive to the most sensitive the order would be as follows :—

(1) Steel framed buildings of the shed type with a light covering.

(2) Steel framed buildings of the office type, in which the steelwork connections are assumed as hinged ends, with panel infilling for the walls.

(3) Monolithic framed buildings, whether of reinforced concrete or welded steel construction.

(4) Buildings with heavy bearing walls and piers of brick or masonry.

In steel framed buildings the stresses in the steelwork owing to the " hinged ends " will not be appreciably affected by small relative settlements. The suspended floors being usually thin are relatively flexible. The appearance of cracks will be mainly confined to partitions and brick panel walls.

The cracking of partitions may be largely avoided if the partitions are kept free from the framework and floors, being held in position by fillet strips along the ceiling and column sides, with a felt or similar bearing strip all round the edge of the partition.

This method of fixing partitions is, incidentally, very advantageous for the avoidance of cracks from temperature variations and drying shrinkage, and has good acoustic properties.

The brick panel walls can be built with a gauged lime mortar which, while being much more flexible than cement mortar, will have ample strength for the panel walls. Generally all jointing materials should be as elastic as possible, consistent with having sufficient strength for its position in the work.

In monolithic framed buildings increased flexibility without appreciable loss in economy, can be obtained by the insertion of points of inflexion in predetermined positions, on the principle of the cantilever bridge with a

PATENT WELDED TUBULAR CONSTRUCTION

Data Sheet No. 7

LIGHT FRAME CONSTRUCTION

The form of light tubular frame construction detailed in this sheet has been designed specifically to fulfil wartime requirements — lightness of structure, simple and rapid assembly, and economy in steel. The particular example dealt with, designed as a store building, provides a floor area of 100 ft. by 30 ft. and has three sets of double doors and six 4 ft. by 4 ft. standard metal casements. The framework of the building is constructed throughout in prefabricated tubular sections, each sectional wall frame (see Fig. 17 overleaf) being supplied complete with doors and window casements. The double doors, being constructed of angle-iron, are self-weathering and are covered with corrugated iron sheeting. To simplify transport and site assembly each column and half-truss is supplied in one welded unit; after erection of the columns and composite trusses the wall and door frames are assembled, and in order to effect rigidity the roof purlins are then engaged and fixed in position before the final fixings and adjustments of the complete structure are carried out. In Fig. 15 the dotted lines represent the gable-end frame, which is also supplied in prefabricated sectional units. Asbestos sheeting is used as an external covering for the walls and roof, and a notable feature of this form of construction is the extremely simple method of fixing the external sheeting. The steel tonnage employed is 5.5 and estimate for delivery and erection (complete with all external sheeting but excluding glazing, gutters and foundations) may be had on application.

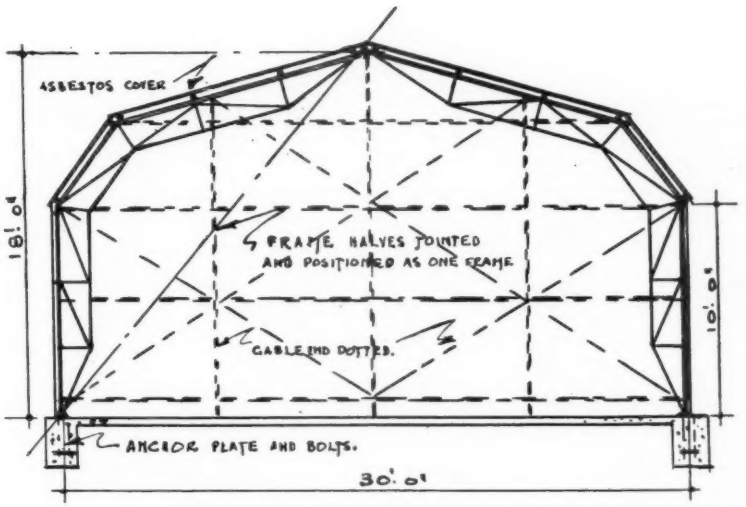


Fig. 15. Light tubular construction incorporating composite roof truss and tubular columns.

This form of construction is extremely flexible and adaptable, the tubular section, being uniform in all directions, allowing connections to be made from any side and at any angle. Further advantages of the tube, as compared with other steel sections, lies in its stiffness (*a*) in taking compressions, and (*b*) during transport.

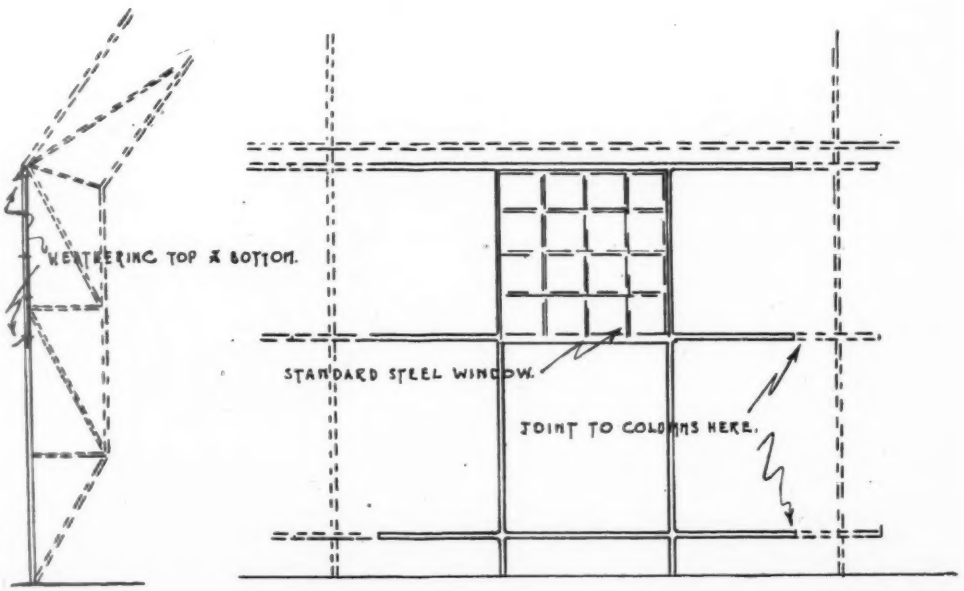


Fig. 16. Tubular column and detail of sectional wall frame incorporating standard metal casement.

(Continued overleaf)

PATENT WELDED TUBULAR CONSTRUCTION—Data Sheet No. 7

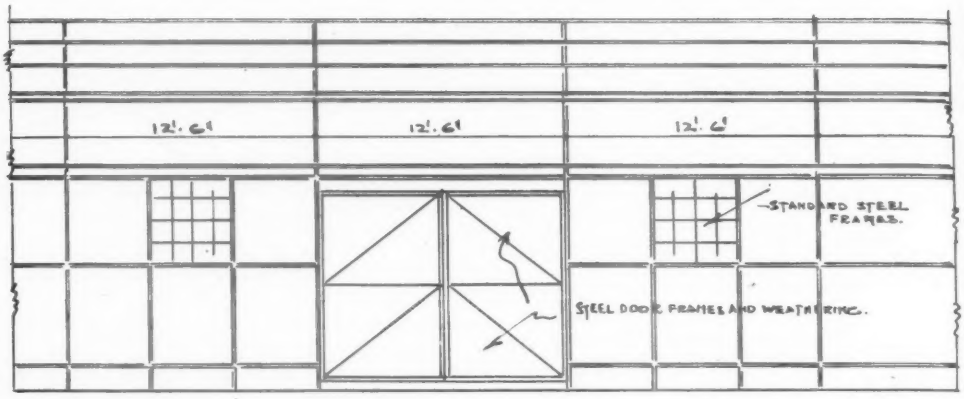


Fig. 17. Part elevation shewing sectional wall framing, standard metal casements and tubular framed double doors.

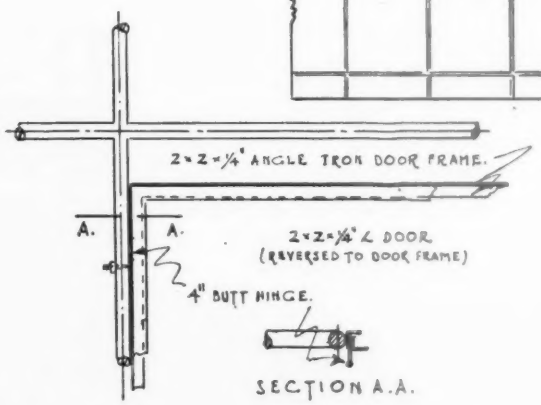


Fig. 18. Detail of door frame construction.

NOTE.—These data sheets are appearing weekly in THE ARCHITECTS' JOURNAL*—they are now available in complete Folder form and application for these Folders should be addressed to Scaffolding [Great Britain] Limited, 77, Easton Street, High Wycombe, Buckinghamshire.*

suspended span, coupled with careful consideration of the treatment of partitions and panel walls.

Buildings with brick bearing walls are difficult to do anything with, but the tendency for the future would appear to be towards framed buildings which have proved so much more resistant to bomb damage.

If the building covers a large area the above precautions alone will probably be insufficient to prevent trouble from relative settlement, and the most satisfactory solution is then to divide the building up into sections, structurally complete in themselves, the breaks being masked by suitable architectural treatment.

Such sub-division of the building is in any case advisable on account of expansion and contraction, resulting from temperature changes.

LECTURES 3 & 4.

On the same day as the above lectures were given, Councillor C. L. Greaves read a paper on the "Scientific Background to Architectural Practice." He said that we were facing a period of rapidly changing technique. Before the war architects had found it difficult to keep abreast of this. The Building Research Station was doing invaluable work. The architect in practice was inundated by the flood of information: a digest in a readable form should be prepared and circulated. A point in running an architect's practice was the necessity of working to an efficient time chart. But many did not do this. The simpler the chart the better. Before work was started, architect, surveyor and building contractor should meet as a committee on the site and discuss the job. It was important to work to time. Costing should be efficient.

With regard to the relation of architects with other professions, in the past there had been too great a tendency to quarrel with engineers. It should be recognized that the work of either was complementary to the other. In certain cases it was an advantage to have a partnership between architect and engineer. There should be very close co-operation between architect and quantity surveyor, and where the work was large enough, it was a good thing for the quantity surveyor's assistants to work in the architect's office.

At the next meeting of the series, Mr. Ewart G. Andrews, B.Sc., M.Inst.C.E., and Mr. C. S. White, A.R.I.B.A., spoke on "The Influence of Recent Scientific Research on the Design of Building Structures."

TRADE NOTE

A new technical booklet describing the uses of Gypklith lightweight building slabs, issued by Gyproc Products Ltd., opens with information concerning the properties of the slabs and an account of the tests made by the National Physical Laboratory with regard to its strength, thermal and sound insulation and sound absorption. This is followed by specifications for the application of external rendering and plaster over Gypklith, and instructions, with drawings, for the erection of Gypklith solid partitions and insulated stud partitions, for the application of the slabs to the underside of timber joist ceiling construction, as permanent shuttering to the underside of roof, ceiling or floor slabs, as an insulation to wall linings applied on battens, as permanent shuttering to concrete or as wall lining with cement rendering, and for the application over timber joist roof construction and over concrete roof surfaces. Gypklith slabs consist of petrified wood fibre, compressed and bound with cement.

Copies of the booklet may be obtained from the firm at Westfield, Upper Singlewell Road, Gravesend.

SOCIETIES AND INSTITUTIONS

SEEING IS BELIEVING

In his presidential address to the Illuminating Engineering Society, Mr. R. O. Ackerley quoted the words of Mr. Ralph Tubbs, who remarked that the finest scholars and thinkers may be so far ahead of what is actually being done as to have progressed out of the sight of the people. One of the greatest services that could be rendered in the 20th century was for such scholars to come back from the hilltop from which they had last seen them and join the people to show them the way the true leaders had gone. He continued:

"As a cultural body the Society has a message to all concerned with lighting on which the great majority of laymen hold definite views and expect to be consulted. It is necessary for the Society to get its message to such people, and also to convince the layman that they are laymen before it can be hoped that they will listen to the experts."

The President emphasized the importance of making contact with national and local bodies in some degree connected with technical problems and with the health and welfare of the community. He pointed out that in the field of lighting visual demonstrations were particularly valuable, and he selected half a dozen demonstrations illustrating most strikingly the important advantages of good lighting in relation to daily life. One or more such demonstrations might well be shown by every speaker on lighting, no matter how his audience was composed. In general such experiments with light had the merit of being so fascinating that they did not bore even those who had seen them previously, and they should be utilized in the spirit of those who descended from the hills to join the people and show them where the leaders had gone.

PLANNING CARDIFF

One of the needs in Cardiff is for a comprehensive civic survey of existing conditions and potentialities to be undertaken, said Mr. T. Alwyn Lloyd, F.R.I.B.A., PP.T.P.I., in reading a paper on "The Planning of our City" at Cardiff Technical College.

He said: Cardiff is very fortunate in its natural situation and form of development. Among these is the best civic centre in Britain, with fine modern buildings in ample surroundings near the heart of the City. There is an exceptional amount of central open space, public and private, and amenities in the business quarters. These benefits are a great heritage for the present generation and a great responsibility; we must see to it that the high standards set in Cathays Park are maintained elsewhere, and safeguard this "openness" of development for the community.

But there are other and less satisfactory aspects of the city—a mass of dull streets and uninspiring suburbs. During the inter-war period there was great activity in new suburban extension, the general effect of which is disappointing. Because of failure to control the layout and design, a great opportunity was missed for creating a newer Cardiff in harmony with the standards set in Cathays Park and in some of the earlier development. In the post-war years there must be more imagination and a tighter control of building, so that this does not submerge the attractive villages and good countryside still remaining on the outskirts. Sporadic building along highways must be prevented and good agricultural soil, with woodlands and landscape of special amenity value, jealously safeguarded. An outstanding case for preservation is the village of St. Fagans, where no urban sprawl nor highway "improvements" should be allowed to destroy its traditional character. Our busy streets and shopping centres can be improved by better control in street planning, and design of facades, to secure a more general unity.

In public open spaces, Cardiff has a good record, though much still remains to be done. A green belt around Cardiff should be envisaged, with "green wedges" radiating into this from the centre. Agriculture would continue within the green belt.

A master-plan for the city, combining all reasonable possibilities for the future, will be infinitely better, and in the long run more economical, than to carry out improvements piecemeal. We have inherited a fine tradition as a fair city in process of growth. Let us see to it that in the words of the Civic Society we "make Cardiff more beautiful" for our own and succeeding generations.

I.S.E. EXAMINATION

The Examinations of the Institution of Structural Engineers will next be held in the United Kingdom on Wednesday, January 13, 1943 (Graduateship), and Thursday and Friday, January 14 and 15 (Associate-Membership). Members who are considering transferring to a higher class of Membership are advised to make early application in view of the possibility of their studies being interrupted.

T.C.P.A.

The President of the Board of Education (Mr. R. A. Butler) received a Deputation from the Town and Country Planning Association and the Council for the Preservation of Rural England. The Deputation, which was led by Professor Patrick Abercrombie, F.R.I.B.A., submitted a memorandum, urging that more attention should be given in the schools, at all stages, to fostering the aesthetic appreciation of design and of all aspects of physical environment.

The upshot of the discussion was that the President welcomed the expression of opinion by the Deputation and promised that their wishes would be met as far as practicable.

The chief points arising from the conversations were as follows. While many schools at the present time are doing their best to teach the younger generation to want good housing and town and country planning, much still remains to be done. The Scheme at Reading whereby the Reading University School of Art provides lectures for teachers in Elementary Schools who in turn can instruct their pupils in the appreciation of design and environment provides a good example. The need for introducing such teaching without overloading the already crowded curriculum had to be kept in mind. There was no question of introducing a new subject or specialist teachers, but rather that the existing teachers should be encouraged to include the appreciation of physical environment in the course of study in art and crafts, in geography or history, and in outdoor study. The standards of building and equipment in the new Senior Schools should go far to help.

The President told the Deputation that they had come at a good moment, for the educational system is in process of being tuned to the changing needs of the future. While the child who leaves at fourteen might soon forget the lessons of the school in matters of taste, the prospect of a later leaving age would make the problem easier. There

should be a good opportunity to do something useful in adult education.

As an immediate step, the President promised to ask the Victoria and Albert Museum to consider circulating an exhibition of good housing to schools, and he suggested that the Deputation should submit evidence to Sir Cyril Norwood's Committee,

HOUSING

The Minister of Health (Mr. E. Brown) speaking at Manchester (see page 291), said he knew from his many journeys to all parts of the country the increasingly unsatisfactory conditions under which large numbers of our people were living, and he was hopeful that house-building might be resumed before the end of the war. The majority of local authorities should be able to decide now on sites which, whatever may be the decisions on national and local planning, would almost certainly be housing sites, and on schemes which would fit into any plan. The Ministry of Health, from the housing aspect, and the Ministry of Works and Planning, from the planning point of view, would give them all possible assistance in coming to their decisions. The Minister noted that Manchester's present and post-war housing needs were estimated to require the building of between 70,000 and 80,000 new houses, of which at least 10,000 would be needed for what the deputation described as priority needs, e.g. families now living in clearance areas already scheduled and in lodgings, and those returning from the Forces who would be without homes for their families. The Minister undertook to arrange for officers of the Ministry of Health and of the Ministry of Works and Planning to visit Manchester at once in order to confer on the spot with officers of the Corporation,

BUILDINGS ILLUSTRATED

MINISTRY OF SUPPLY HOSTEL IN NORTH WALES (pages 295-298) Wood, Goldstraw & Yarath, architects for the Ministry of Works and Planning. General contractors, G. & J. Seddon Ltd.; sub-contractors and suppliers included; Comyn Ching & Co., heating, hot water and steam sources; Berkeley Electrical Engineering Co., Ltd., electrical installation; Whitley Brothers, roads, drainage and site work; Penmaenmawr & Trinidad Lake Asphalte Co. Ltd., colorphalt flooring; Lightfoot Refrigeration Co., Ltd., refrigeration; General Electric Co., Ltd., public address and wireless installation; Castle Brick Co., bricks; Concrete Ltd., "Bison" roof slabs; J. G. Ellison, roofing felt.

DIARY

Thursday, November 5

Town and Country Planning Association. At Y.W.C.A., Gt. Russell Street, W.C.2. 1.15 p.m. "Landscape Architecture and Planning," by G. A. Jellicoe.

Friday, November 6

Council for the Preservation of Rural England. Annual General Meeting at the R.I.B.A., 66, Portland Place, W.1. 11.30 a.m. Chairman, Professor Patrick Abercrombie, M.A. The Rt. Hon. Lord Portal of Laverstoke, Minister of Works and Planning, will address the meeting.

Saturday, November 7

Incorporated Association of Architects and Surveyors, 75, Eaton Place, S.W.1. 2.30 p.m. "The Legal Implications of the Recommendations of the Uthwatt Report," by the Hon. Dougall Meston (Barrister-at-Law). Tickets, Hon. Secretary, London Branch, I.A.A.S., 75, Eaton Place, S.W.1.

Tuesday, November 17.

Leicester College of Art and Crafts, School of Architecture, 6.15 p.m., "Houses to Live In." By Miss Judith Ledeboer, A.R.I.B.A., Ministry of Health Housing Advisory Committee. Chairman: Miss G. S. Haigh, B.SC.

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THE ARCHITECTS' JOURNAL

INFORMATION CENTRE

Q 985

ARCHITECT, YORKS.—*Please tell me HOW TO DRY NON-ENAMELLED PLATES quickly and effectively so that they do not rust. At the moment all plates used in a certain communal feeding centre are laboriously dried by hand.*

Mechanical methods of drying plates are too expensive for communal feeding centres and you would not be able to obtain a licence for the machinery involved. The recommendations of the Canteen Department of the Ministry of Works and Planning are as follows:—

After cleaning the plates in hot water dip them separately in clean boiling water (or water with a temperature of at least 190° F.). This will remove any film of grease and will heat the plates so that the water will evaporate and leave the plates dry without danger of rusting. The plates should then be stacked in a rack.

Q 986

ARCHITECT, NORTHAMPTON.—*Should an assistant, who takes part in an open ARCHITECTURAL COMPETITION after his office hours, inform his principal about doing so?*

There is no obligation upon an assistant to give any information to his employer as to the way he spends his leisure hours. The matter depends very much upon the relationship existing between the assistant and his employer; many assistants would, as a matter of courtesy, inform their employers and might feel a particular obligation to do so if, for instance, they were deferred from Military Service because of the work upon which they are engaged.

Q 987

CONTRACTOR, BANFF. — *Is there any method of treating empty JUTE CEMENT BAGS which have got wet and hard?*

As far as we can ascertain there is no method of treating empty jute cement bags to restore them to their former condition after they have been damp and become hard.

Q 988

ENQUIRER, LANCS.—*Where can I obtain particulars of the method of TESTING C.I. WATER MAINS, and also the pressure to which they are tested? Can you recommend any books relating to Public Water Supply, particularly one which covers laying and testing water mains, storage tanks, reservoirs, etc., dams and sluices and pumping equipment?*

For information as to the testing of cast-iron water mains, etc., you should obtain B.S.S. 78/1938 from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 5s. 0d.

For information relating to Public Water Supply, etc., we should advise:—

The Supply of Water by J. H. Veale (1931 edition), published by Chapman and Hall, price 15s. 0d.

Waterworks for Urban and Rural Districts by H. F. Adams, published by Sir Isaac Pitman & Sons, Ltd., price 15s. 0d.

Q 989

ARCHITECT, WILTS.—*I was registered as an Architect under the Architects' Registration Act, 1931, and have MISLAID the CERTIFICATE OF REGISTRATION. Can you tell me where to obtain a copy?*

The Architects' Registration Council of the United Kingdom, 68, Portland Place, London, W.1.

REFERENCE BACK

[*This section deals with previous questions and answers*]

Question 951 (A.J., August 20). The answer is quite correct. No new statutory powers have been granted to local authorities since the outbreak of war but I think your questioner probably had in mind Circular 1 issued by the Ministry of Works and Planning.

GEORGE L. PEPLER.

London.

PRICES

BY DAVIS AND BELFIELD, CHARTERED QUANTITY SURVEYORS

There has been no alteration in the prices of Basic Materials except for Lime Greystone and White Lead Paint, which have risen. The Rates of Wages remain the same as last month.

BASIC MATERIALS	Increase over pre-war prices at end of									
	Jan., 1942	Feb. 1942	Mar., 1942	April, 1942	May, 1942	June, 1942	July, 1942	Aug., 1942	Sept., 1942	Oct., 1942
	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
Portland cement	+37·8	+37·8	+37·8	+37·8	+37·8	+37·8	+37·8	+41·46	+41·46	+41·46
2-in. unscreened ballast	+71·01	+71·01	+71·01	+71·01	+71·01	+71·01	+71·01	+71·01	+71·01	+71·01
Fletton bricks (at station)	+11·89	+11·89	+11·89	+11·89	+18·38	+18·38	+29·19	+29·19	+29·19	+29·19
Stoneware drainpipes (British Standard) 2 tons and over	+28·13	+28·13	+28·13	+28·13	+28·13	+28·13	+37½	+37½	+37½	+37½
Roofing tiles	+30	+30	+30	+30	+30	+30	+42½	+42½	+42½	+42½
Steel joists (basic sections) ex mills	+47·5	+47·5	+47·5	+47·5	+47·5	+47·5	+47·5	+47·5	+47·5	+47·5
Lime greystone	+35·29	+35·29	+35·29	+35·29	+35·29	+35·29	+35·29	+35·29	+35·29	+43·53
Sheet lead	+54·35	+54·35	+54·35	+54·35	+54·35	+65·22	+65·22	+65·22	+65·22	+65·22
Iron rainwater goods and soil pipes	+26½	+26½	+26½	+26½	+26½	+26½	+26½	+26½	+26½	+26½
Copper tubes	+29·79	+29·79	+29·79	+29·79	+29·79	+29·79	+29·79	+29·79	+29·79	+29·79
White lead paint	+31·82	+31·82	+36·36	+36·36	+36·36	+36·36	+38·64	+38·64	+38·64	+41·67
RATES OF WAGES (Central London Area)										
Labourers	+19·05	+22·22	+22·22	+22·22	+22·22	+22·22	+22·22	+22·22	+22·22	+22·22
Craftsmen	+14·29	+16·67	+16·67	+16·67	+16·67	+16·67	+16·67	+16·67	+16·67	+16·67

LABOUR—Rates of Wages since 1st February, 1942.

LONDON DISTRICT	Craftsmen	Labourers	N.B.—Painters
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From 12-15 „ „	2s. 0d.	1s. 7d.	other craftsmen

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	A	A¹	A²	A³	B	B¹	B²	B³	C
Craftsmen	1/11	1/10½	1/10	1/9½	1/9	1/8½	1/8	1/7½	1/7
Labourers	1/6¼	1/5¾	1/5¼	1/5	1/4¾	1/4⅛	1/4	1/3⅜	1/3⅛

P. A. Davis

F.S.I.

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