THE DIGNITY OF THE CRAFTSMAN

Through the past half-century Harris & Sheldon have been a dominant factor in meeting Shopfitting needs where authenticity of design and integrity of workmanship were prime essentials.
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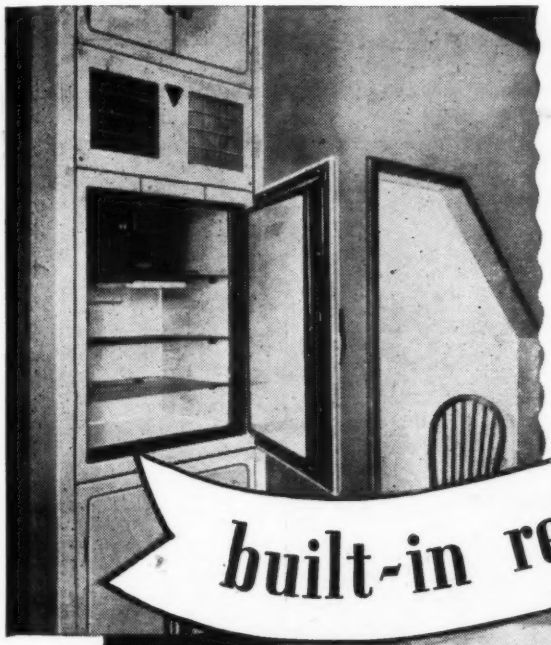
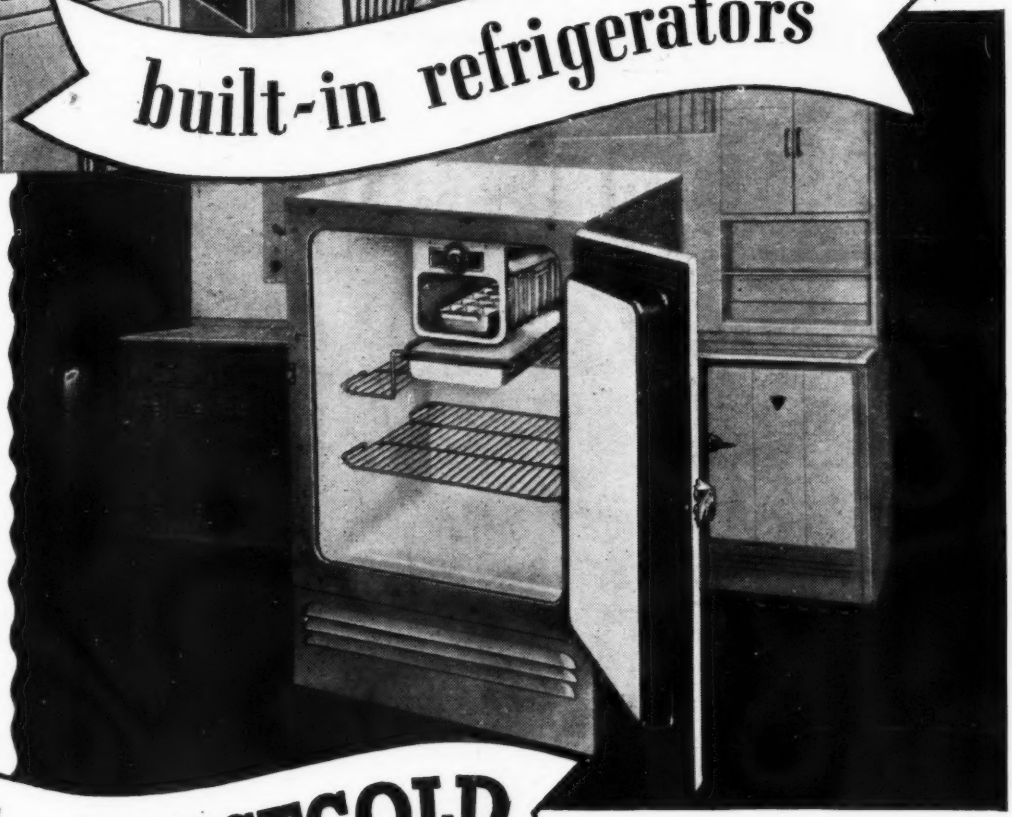


Prestcold built-in refrigerators embody many outstanding advantages which architects and designers have been quick to appreciate. The model illustrated on the left has storage capacity of approximately 4½ cubic feet, includes ice making and "cold cooking" facilities, needs no special air-bricks or ducting for ventilation of mechanism, and can be incorporated at any height into modern kitchen fitments. It has received great attention at all kitchen exhibitions at which it has been shown.

built-in refrigerators



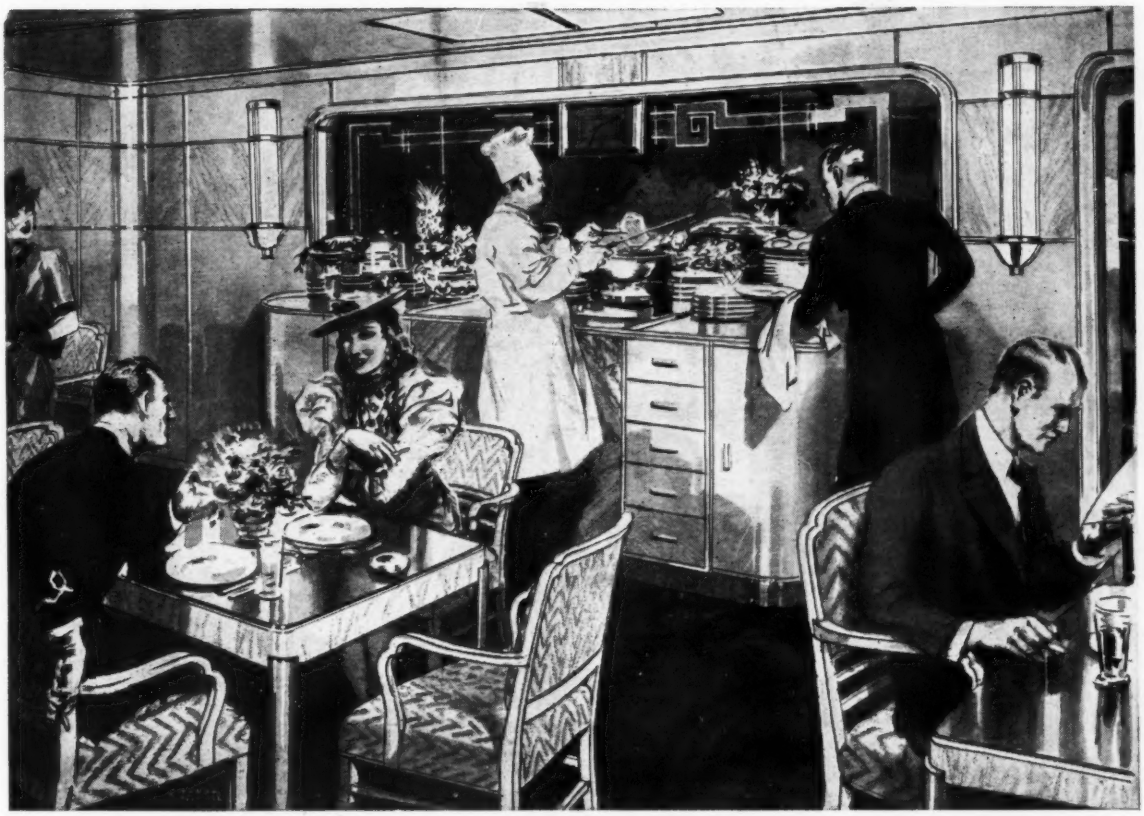
by PRESTCOLD

Illustrated above is the 3 cubic feet Prestcold refrigerator supplied to Government orders, for present-day housing schemes.

Any enquiries concerning built-in refrigerators will be welcomed by our technicians, and a free advisory service is readily at your disposal. Please write if you think we can help.

PRESTCOLD WILL MAKE REFRIGERATION AN EVERY-HOUSEHOLD WORD

A PRODUCT OF THE PRESSED STEEL CO. LTD., COWLEY, OXFORD



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. . . INCLUDING THE INTERIOR DECORATION: the modern restaurant, dining or grill room, where dirt and dullness are the unforgiveable sins . . . where 20th Century design must be backed by 20th Century materials . . . where beauty must be allied to efficiency and durability. Here is the place for Warerite Laminated Plastics, those remarkable modern materials which *stay* smart . . . resist hot liquids, hot dishes, spirits, fruit juices etc., and can be wiped clean with a damp cloth. Warerite tops for tables, counters, sideboards and bars are available in a range of colours and surfaces, some with permanent designs incorporated into the material during manufacture. Warerite Veneered Boards are ideal for surfacing walls, doors and built-in fitments. Write for further details.

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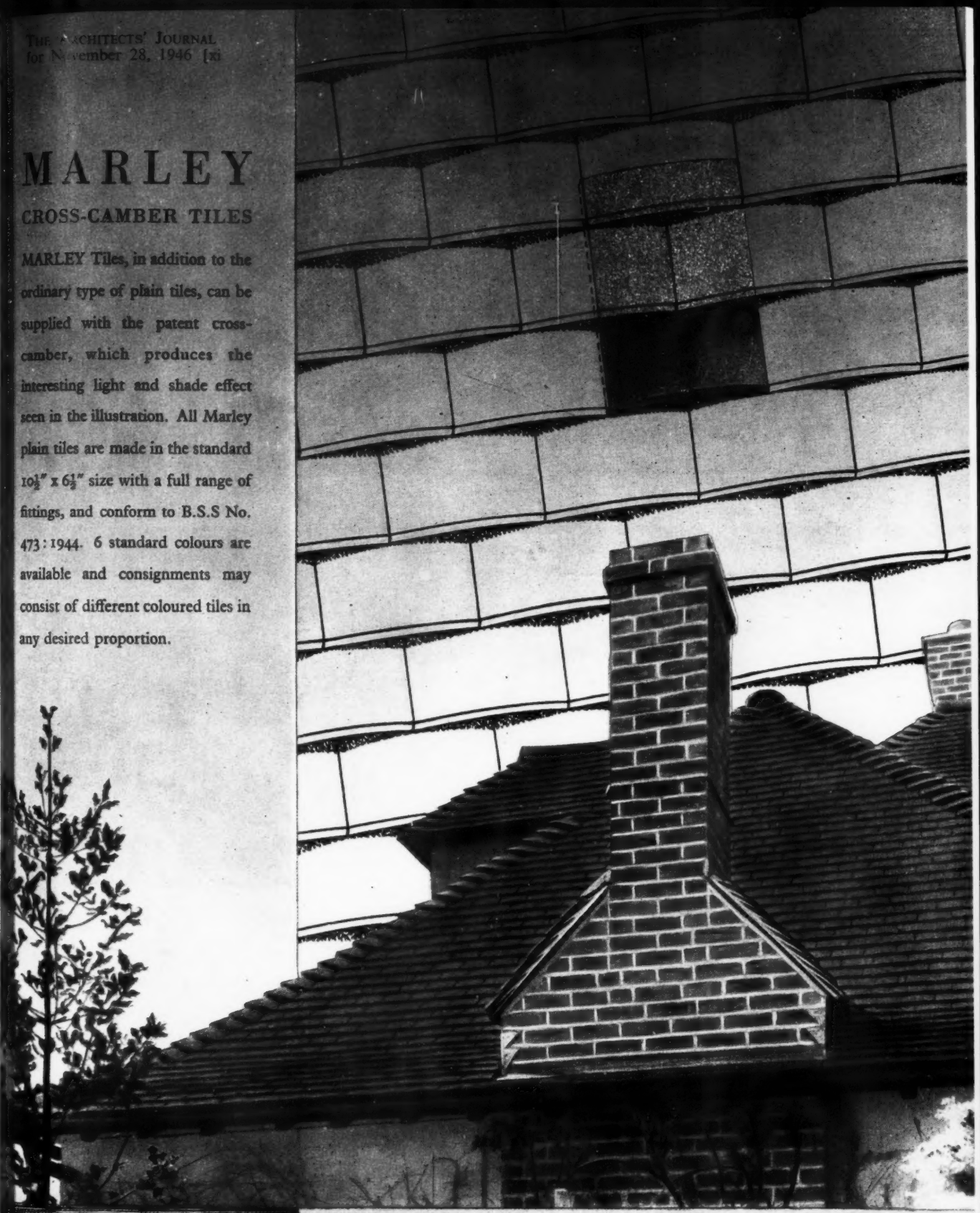
MARLEY

CROSS-CAMBER TILES

MARLEY Tiles, in addition to the ordinary type of plain tiles, can be supplied with the patent cross-camber, which produces the interesting light and shade effect seen in the illustration. All Marley plain tiles are made in the standard 10½" x 6½" size with a full range of fittings, and conform to B.S.S No. 473 : 1944. 6 standard colours are available and consignments may consist of different coloured tiles in any desired proportion.



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but for all time

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M.T.

Ebb and Flow

Prediction of tides around our coast is the result of most accurate periodic observation at certain points, and the regularity of the moon's attraction. Tide-tables, accurate to the minute twice daily, at an average interval of 12 hours 24½ minutes, are unnoticed but important items governing the daily life of these islands, whether by incoming freighters bearing our daily bread or trawlers outgoing to find our fish.

Hand in hand with the great advances made in the technique of synthetic resin products, this Company looks forward to playing its part in the great reconstruction.

The Midland Woodworking Company Ltd

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Colour, shrewdly applied, can achieve wonders. With its subtle aid, the ill-proportioned room can be endowed with grace and character, the fine hall transformed into a restaurant that is the talk of European capitals. But real discrimination must be shown in choosing colours, and equal care taken to select the right materials, if this beauty is to endure through the years.

Where beauty counts, "Dulux" glossy finishes have long been a first consideration of the specialist in hotel and restaurant decoration. For exterior or interior uses they combine durability, ease of cleaning and scratch-resistance and have never been surpassed in the decorative field.

"Dulux", the most durable of all finishes, cannot yet be supplied. The Paints Division of I.C.I. will, however, gladly give expert advice on any painting problem, in anticipation of the time when "Dulux" and their other finishes are again freely available.

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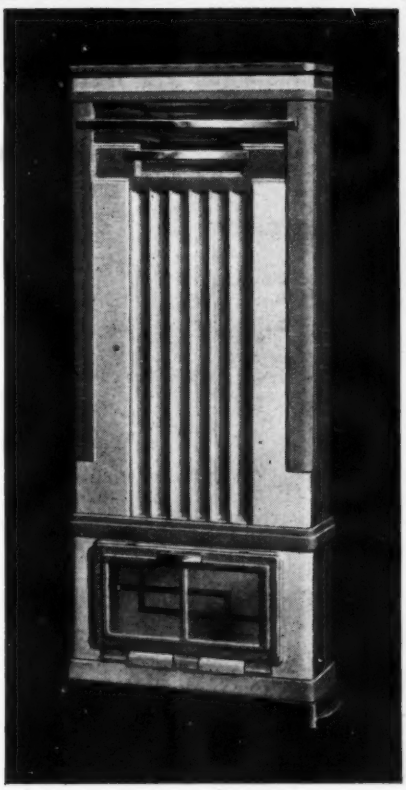
quickly warms the apartment, and at the same time keeps the air circulating. IT REQUIRES NO FLUE, and as the heat issues from the front, discoloration of the walls or ceiling is virtually eliminated . . . The design is simple, and all parts are accessible for any little cleaning required. The body is made from sheet steel for long service, with cast-iron parts where additional rigidity and strength are necessary.



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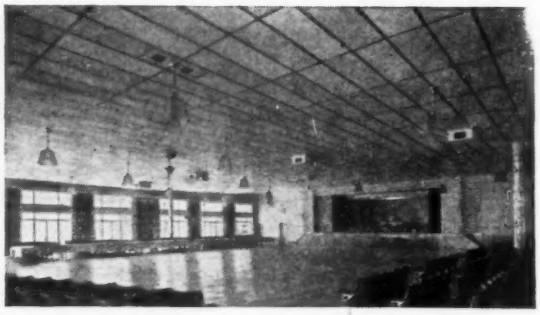

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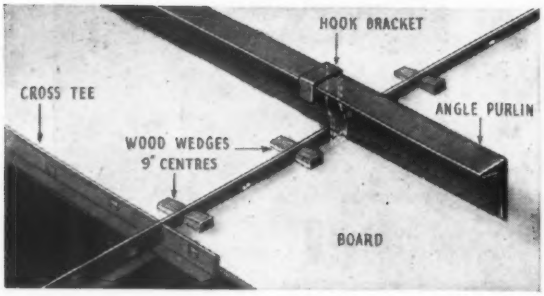
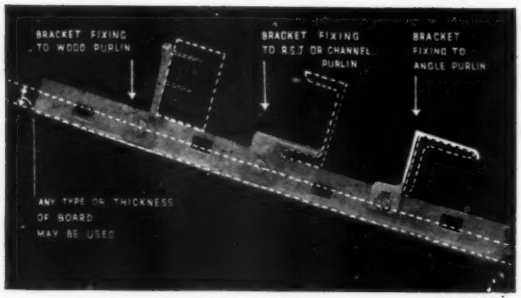




TAS/AN8

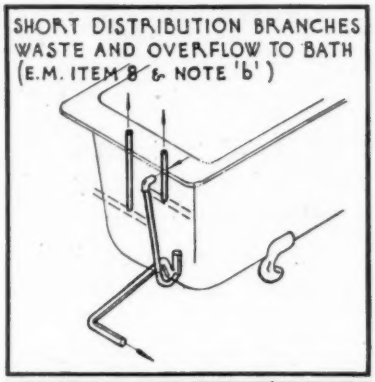
LEAD for building purposes

is available for certain minimum uses set out in a new Economy Memorandum issued by the Ministry of Health. The purpose of this Memorandum is to ensure that available supplies of lead are used to the best advantage. The uses permitted by the Memorandum are described and illustrated in a leaflet "Vital Minimum Uses of Lead Sheet and Pipe in House Building," copies of which may be obtained from L.I.D.C. Three examples of such vital uses are given below.

SUPPLY AND DISTRIBUTION PIPING

The introduction of flexible pipe material for short branch connections to plumbing fixtures will reduce site hours. It will also facilitate the application of off-site preparation methods to repetition work by making provision for the inevitable variations in dimensions of both building work and sanitary appliances.

A maximum length of 3′ 0″ of lead or lead alloy pipe may be used to provide fixing tolerances at connections to fittings. (See note (b) to E.M.)



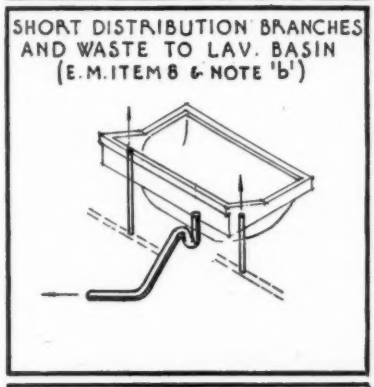
WASTE AND WASTE VENT PIPES

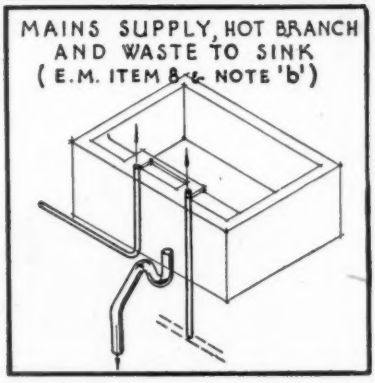
Lead is generally accepted as the most reliable material for waste and waste vent pipes. No other material can be so readily adapted to any set of conditions, and furthermore it does not require the use of expensive fittings.

For repetition work it is a straightforward matter to produce short waste pipe elements in the workshop together with their bends ready for the plumber to fix on site.

Fixing on site presents no difficulties as the flexibility of the material permits the adjustment invariably necessary to meet dimensional variations in both appliances and the structure.

For this purpose the maximum length of pipe permitted is 5 ft. to each fitting. (See Item 8 of E.M.).





The Technical Information Bureau of the Lead Industries Development Council, which exists to give assistance on problems relating to the use of lead sheet and pipe in building work, will be pleased to give advice on any questions relating to the present restricted uses of the materials.

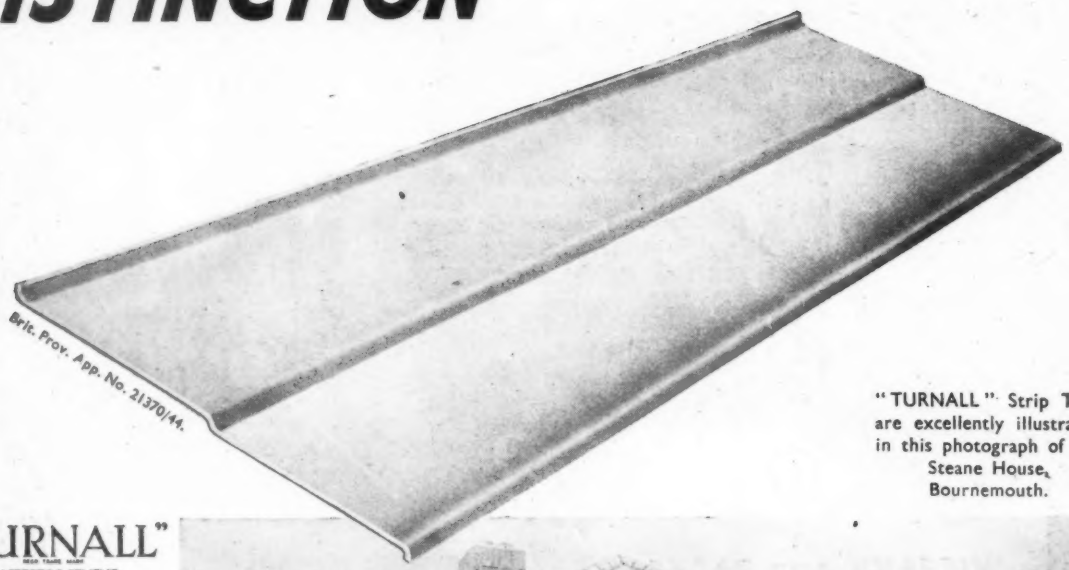
LEAD

LEAD INDUSTRIES DEVELOPMENT COUNCIL, EAGLE HOUSE, JERMYN STREET, LONDON, S.W.1

LEAD TECHNICAL INFORMATION BUREAU, 25 LOWER BELGRAVE STREET, S.W.1

B.29

ECONOMY WITH DISTINCTION



"TURNALL" Strip Tiles are excellently illustrated in this photograph of the Steane House, Bournemouth.

"TURNALL"
ASBESTOS-CEMENT
STRIP TILES

CONSIDER THESE FACTS:—

Overall Length 6 ft. 0 in.
Overall Width 2 ft. 0 in.
Weight per square 552 lbs.

FIXED DIRECT TO WIDELY SPACED RAFTERS

NO BATTENS OR BOARDING REQUIRED

HERE AT LAST IS THE ROOFING TILE WHICH EMBODIES SPEED AND ECONOMY IN APPLICATION WITH DISTINCTION IN DESIGN.

WRITE FOR DESCRIPTIVE LEAFLET SECTION 4/C.

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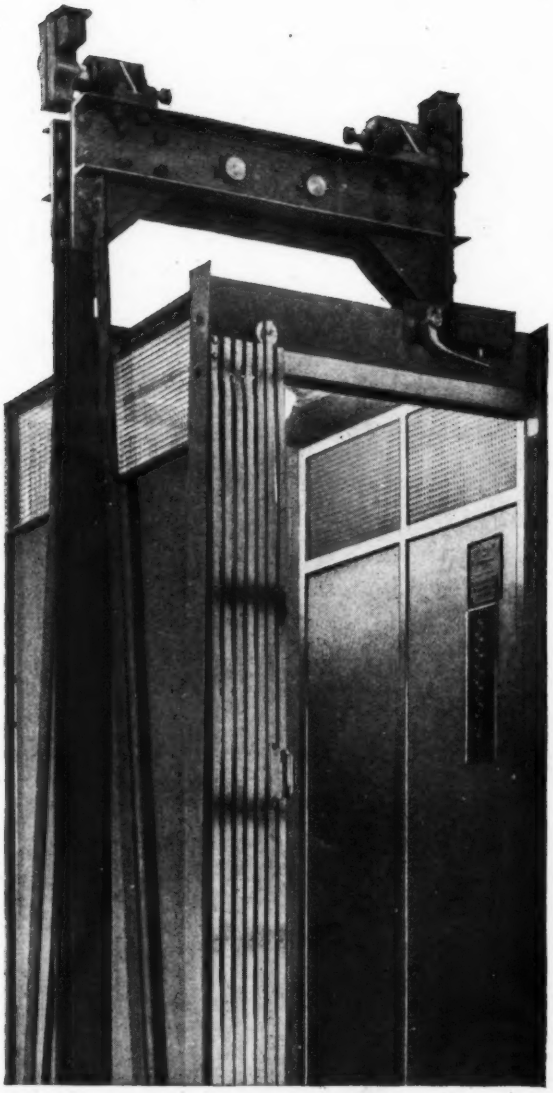
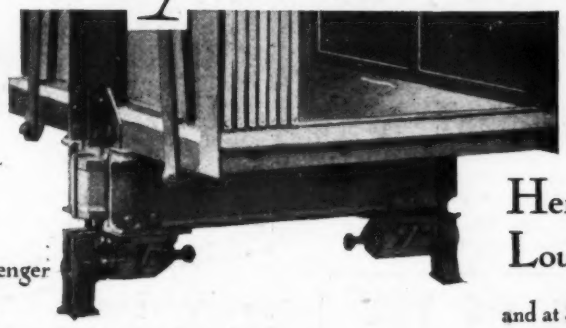


Lifts by MORRIS



Morris two-passenger all-steel lift car.

Herbert Morris Limited
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"I have now decided to reduce the maximum allowance to 1.6 standards for the normal three-bedroomed house in England and Wales. The principal modification which will be necessary to achieve this reduction is the adoption of solid ground floors in lieu of timber joists and boarded floors in all new houses, and I am asking all local authorities to introduce this economy quickly."

Mr. Bevan's written answer to a question in the House of Commons on Softwood Shortage, 31st October, 1946.

North British Rubber Flooring is the architect's obvious choice in flooring materials where clients desire silence and long wearing qualities combined with infinite variation of pattern and colour scheme.

Meantime, supplies are, unfortunately, limited.

THE NORTH BRITISH RUBBER COMPANY LIMITED • EDINBURGH & LONDON

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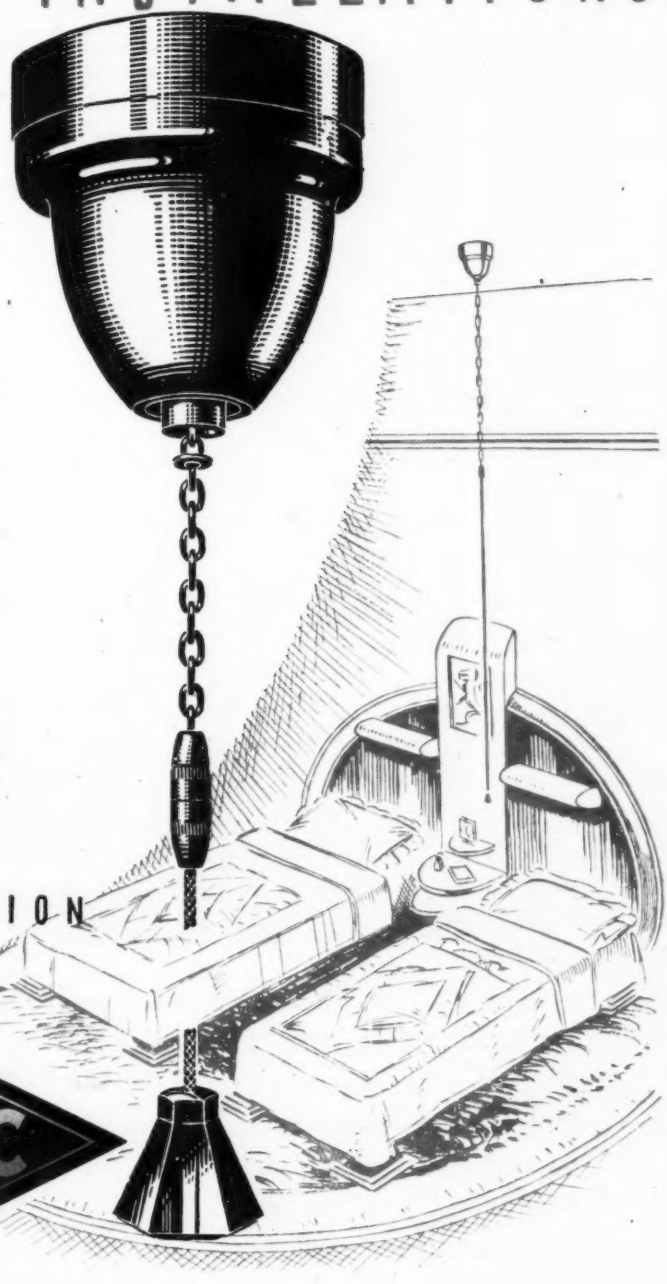

In spite of continued restrictions all available supplies of "Britmac" Electrical Accessories are reaching the recognised Electrical Wholesalers who, we know, are doing their utmost to meet your demands.

Illustrated is the Surface Type, "Universal" pattern Ceiling Switch, for mounting direct to B.S. Conduit Boxes. Catalogue No. P2736.

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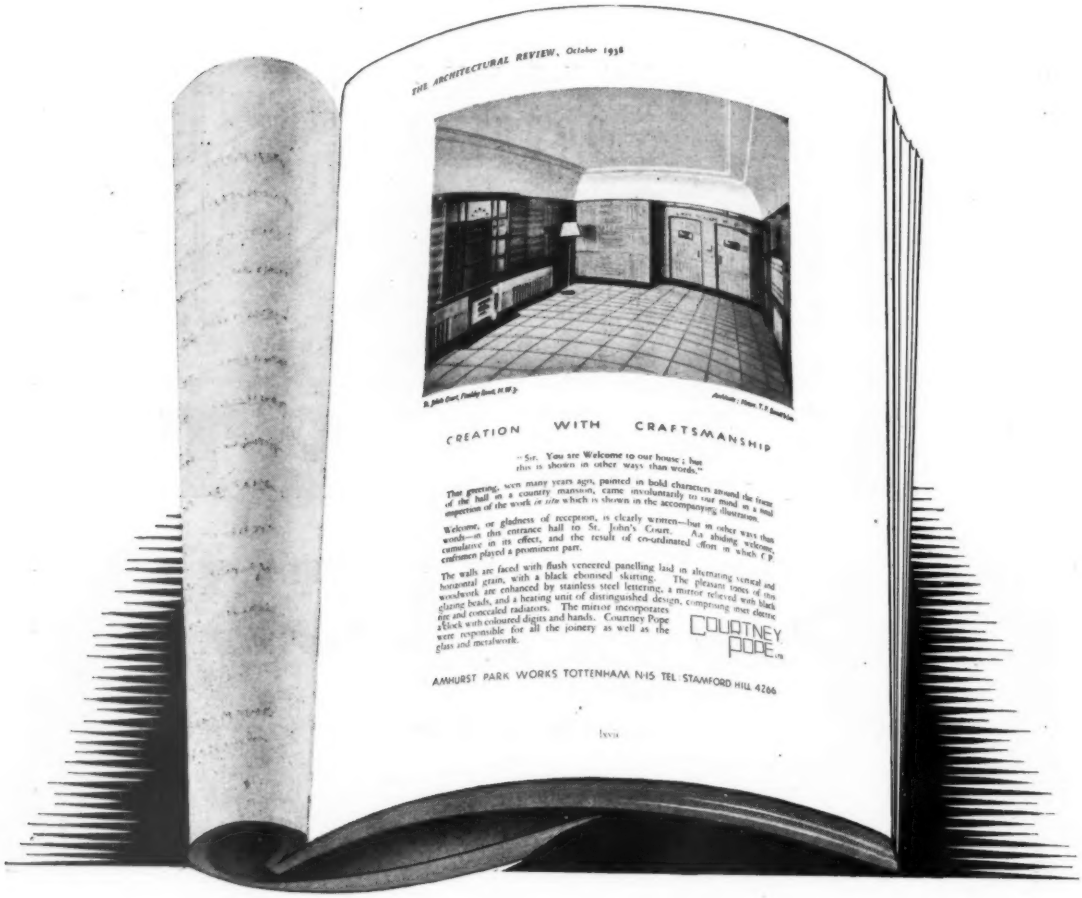

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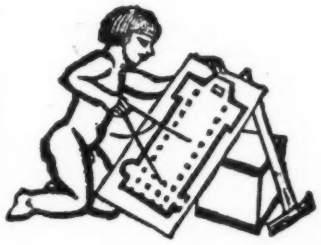
In common with every other periodical this JOURNAL *is rationed to a small part of its pre-war needs of paper. Thus a balance has to be struck between circulation and number of pages. We regret that unless a reader is a subscriber we cannot guarantee that he will get a copy of the* JOURNAL. *Newsagents now cannot supply the* JOURNAL *except to a "firm order." Subscription rates: by post in the U.K. or abroad, £1 15s. 0d. per annum. Single copies, 9d.; post free, 11d. Special numbers are included in subscription; single copies 1s. 6d.; post free, 1s. 9d. Back numbers more than 12 months old (when available), double price. Volumes can be bound complete with index, in cloth cases, for 15s. each; carriage 1s. extra. Goods advertised in the* JOURNAL *and made of raw material now in short supply, are not necessarily available for export.*



DIARY FOR NOVEMBER DECEMBER AND JANUARY

Titles of exhibitions, lectures and papers are printed in italics. In the case of papers and lectures the authors' names come first. Sponsors are represented by the initials as given in the glossary of abbreviations on the front cover.

BIRMINGHAM. *Can the IES Code be Profitably Applied to Industry?* Debate at the Imperial Hotel, Temple Street, Birmingham. (Sponsor, IES Birmingham Centre, Midland Area.) Tea buffet 5.30 p.m. Debate 6 p.m. DEC. 6

LONDON. *New Homes for Old.* Exhibition of House Conversion at the Tea Centre, 22, Lower Regent Street, S.W.1. 10.30 a.m.- 5.30 p.m. Saturdays, 10.30 a.m.-4.30 p.m. Admission 1s. (Sponsor, HC.) Until Nov. 28

Neighbourhood Planning. Exhibition at the Housing Centre, 13, Suffolk Street, Haymarket, S.W.1. (Sponsor, HC.) Until DEC. 13

Exhibition of the King's Pictures. At the Royal Academy, Piccadilly, W. About 500 paintings in the Royal Collection, selected from all the Palaces in which the collection is permanently kept. Includes a large number of works not normally accessible to the public. Weekdays, 10 a.m. to 7 p.m. Sundays, 2 p.m. to 7 p.m. Admission 1s. 6d. Until MAR. 16

House-Building Industries' Standing Committee Conference. At the Seymour Hall, Marylebone. Nov. 28

D. B. Williamson. *New Beginnings and New Towns.* At 28, King Street, Covent Garden, W.C.2. Buffet lunch, 12.45 p.m. Talk and discussion, 1.15 p.m. (Sponsor, TCPA.) Nov. 28

Lady Allen of Hurtwood. *Real Playgrounds for Children.* At the Housing Centre, 13, Suffolk Street, Haymarket, S.W.1. Buffet lunch, 12.45 p.m. Talk 1.15 p.m. (Sponsor, HC.) DEC. 3

H. G. Maule. *Health and Welfare in Factories.* At the RIBA, 66, Portland Place, W.1. Light refreshments 5 p.m. Lecture 6 p.m. (Sponsor, RIBA Architectural Science Board.) DEC. 4

Mrs. C. G. Tomley, of the Council of Industrial Design. *Interior Decorating for Small Homes.* At the Housing Centre, 13, Suffolk Street, Haymarket, S.W.1. Buffet lunch 12.45 p.m. Talk 1.15 p.m. (Sponsor, HC.) DEC. 10

J. W. H. King. *The Effect of Lateral Reinforcement in Reinforced Concrete Columns.* At the Institution of Structural Engineers, 11, Upper Belgrave Street, S.W.1. 6 p.m. (Sponsor, ISE.) DEC. 12

John Gloag. *Planning Research for Industrial Design.* At the Royal Society of Arts, John Adam Street, Adelphi, W.C.2. Chairman, Sir Charles Tennyson, Chairman of the Central Institute of Art and Design. 5 p.m. (Sponsor, RSA.) DEC. 11

Professor J. D. Bernal. *Is Town Planning a Science?* At the Town and Country Planning Association, 28, King Street, Covent Garden, W.C.2. Buffet lunch 12.45 p.m. Talk and discussion, 1.15 p.m. DEC. 12

British Road Federation's First Post-War Exhibition. At the Empire Tea Bureau, 22, Lower Regent Street, W.1. Primarily the object of the exhibition is to assist road constructional engineers, designers and other technical experts to maintain contact with the new developments, both in this country and abroad. Its second feature will explain to the general public the existing highway conditions and the plans already made to alleviate the position, together with possible developments of the future. Weekdays, 10.30 a.m. to 7 p.m. Sundays, 2.30 p.m. to 6 p.m. (Sponsor, BRF). December 5-January 11. Lunches and guests of honour at the Savoy Hotel in connection with the exhibition: December 4, Rt. Hon. Alfred Barnes, M.P., Minister of Transport; December 11, Major H. E. Aldington, Chief Engineer, Ministry of Transport, December 18; Sir Patrick Abercrombie. DEC. 5-JAN. 11

Your New Home. House Building Industries' Exhibition. At the Housing Centre, 13, Suffolk Street, Haymarket, S.W.1. (Sponsor, HC.) DEC. 17-JAN. 12

Sir Alker Tripp. *Planning for Road Safety.* At Livingstone Hall, Broadway, Westminster, S.W.1. 5.30 p.m. (Sponsor TPI.) DEC. 19

MANCHESTER. *Annual Dinner, Institution of Heating and Ventilating Engineers. Manchester and District Branch.* At the Grand Hotel, Aytoun Street. DEC. 13

Americana V Exhibition. At 19, York Street, Manchester, 2. Weekdays, 10 a.m. to 5 p.m. Sundays, 10 a.m. to 12 noon. (Sponsor, Colour, Design and Style Centre of the Cotton Board.) Until DEC. 21

NORFOLK. *What is Modern Painting?* Exhibition at Norfolk Education Committee Youth Centres. (Sponsor, Arts Council.) Until DEC. 4

PARIS. *British Architecture* 1939-1946. Exhibition arranged by the British Council on behalf of the Ministry of Education in connection with the First General Conference of UNESCO. The exhibition consists of eleven wall panels, carrying photographs, architects' drawings and text in French and English. The panels were executed by the Design Research Unit in conjunction with Peter Ray. Until DEC. 10

NEWS

THURSDAY, November 28, 1946
No. 2705 VOL. 104

Though no feature in the JOURNAL *is without value for someone, there are often good reasons why certain news calls for special emphasis. The* JOURNAL*'s starring system is designed to give this emphasis, but without prejudice to the unstarred items which are often no less important.*

★ *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 features marked with more than two stars is very big building news indeed.

British troops in Austria are giving active support in REBUILDING VIENNA'S MOST FAMOUS BUILDINGS.

Schoenbrunn Palace is being used as a headquarters for the British Element of the Allied Commission for Austria but the greatest care has been taken to preserve all the rooms and the furnishings without damage. The Palace suffered one direct hit during an air raid on the main building and several on the out-buildings. To hasten repairs after the arrival of British troops in Vienna, the assistance of the Royal Engineers was called in and to-day the roof is restored to its original condition, damage to walls and floors has been completely repaired and the Palace will soon assume in detail its old appearance. The Schoenbrunn State Theatre, built originally in 1744-1749, has also been completely restored. The Wagenburg building, with its royal carriages, was in need of urgent repair because the roof was leaking and needed reinforcing. This has been done together with a great deal of work in the Palace grounds. Work has started in the zoo grounds on an old pavilion where the Imperial Family used to lunch *al fresco*. In the international district of Vienna, considerable British assistance continues to be given in work on famous buildings. St. Stephen's itself recently received a gift from the British Government of essential material, including paints, colours and varnishes, required for redecoration. Other buildings receiving attention from the British Monuments and Fine Arts Officers in Vienna are the Augustinerkirche, the Salvator Kapelle, the Albertina and the Lichtenstein Palace. Further deterioration has been halted, movable works of art conserved and work continues to restore the architecture completely.

Craftsmanship Lives Anew in

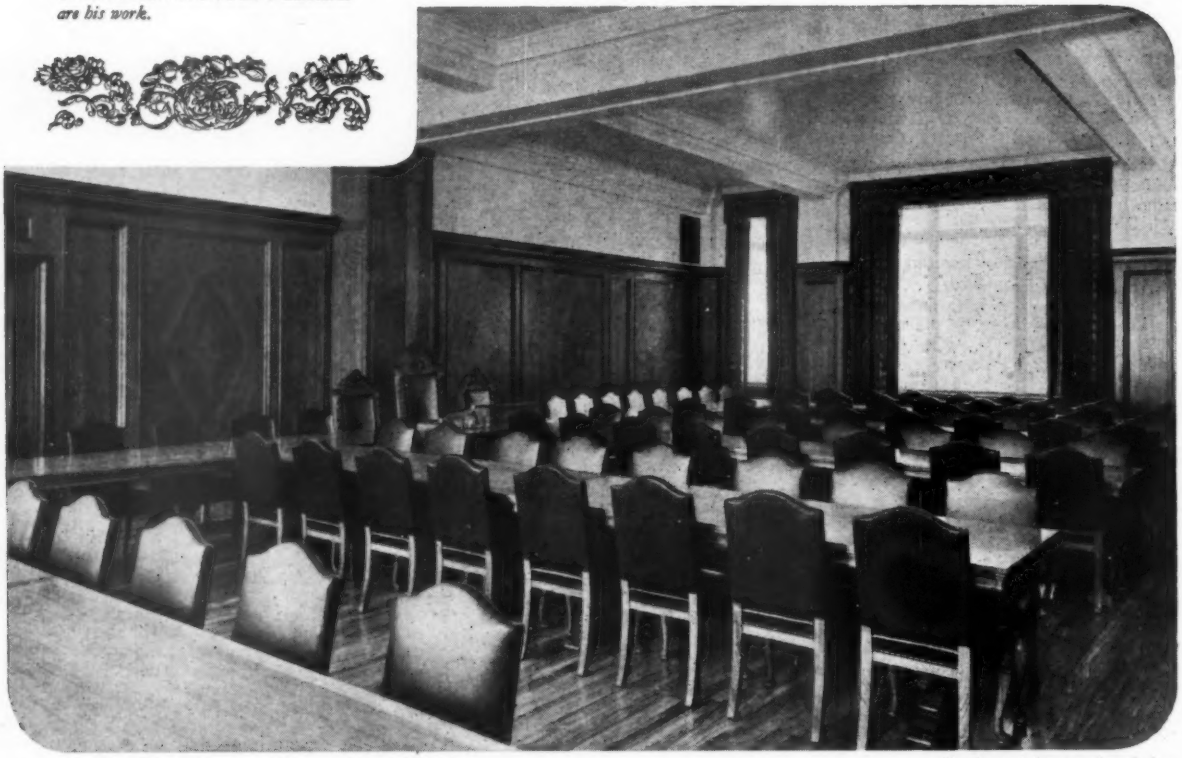
FINE TIMBER

GRINLING GIBBONS
(1648 – 1721)

Wood carver and statuary. He specialised in carving pendant groups and festoons of flowers, fruit, game and other ornaments, life-sized and carefully copied from nature. The choir stalls in St. Paul's Cathedral are his work.

The owners of the great 17th and 18th century mansions recognised in fine timbers the most expressive medium to crystallise the work and genius of great craftsmen.

The craftsmen and designers of to-day have the advantage of being able to call on many other allied materials and services—veneers from all over the world, water resistant plywood (flat, shaped or metal faced), kiln drying, fireproofing, and various other modern achievements.



The Council Room of the London Chamber of Commerce.
Architects: Gunton and Gunton, F.R.I.B.A. Contractors: F. G. Minter Ltd.

Furniture designed and made by: Beresford & Hicks Ltd.

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From AN ARCHITECT'S *Commonplace Book*

HOW ART AND SCIENCE ARE RELATED. [*From* Art and Scientific Thought, by *Martin Johnson* (*Faber and Faber*).] The transmission of ideas by means of formal pattern is strongly reminiscent of a process which is the essence of modern science. Indeed, communication by pattern and structure in imaginative art has likenesses and differences which may now be noticed, relative to communication by the mathematical form of a scientific theory. It differs by the great variety of the private mental images stimulated by a single work of art, compared with the identity of all identically planned experiments whereby different observers verify a single scientific theory. But however many the fantastic images stimulated by the picture or poem, they may all be as remote from direct sense-experience as is the physicist's atom or electron. They may have equal claim to " reality " through their practical significance for human destiny and understanding ; they must each submit to test of their legitimacy through their usefulness in communicating some coherent state of mind . . . Both by historical accident and by the misfit of incompatible temperament, the contacts between science and art have brought one or the other to contempt or frustration. The resulting danger to any plans for future combined education is not easy to see or avoid in the welter of current scientific progress and artistic fashion . . . Imagination and intellect are not always in antithesis to one another. Reason implies not only a capacity for logical sequence of argument, but also a sensitivity to balance and contrast, a trained intuition without untrained intuition's arrogant claims to short-circuit the discipline of the intellect. When the imagination thus becomes disciplined, and undertakes the severest obligations inherent in perfecting the pattern of an art-form, it has taken the essential step towards security against the weakness of fantasy. Structure as disciplined as that of a mathematical argument is capable of transfiguring the merest nonsense into divine nonsense . . . The subject of physical science is confined to the measurable, whereas the subject of the arts is qualitative, not quantitative. With this distinction guarded, the physicist and the imaginative artist might learn to see in one another the reflection each of his own aim, discipline and method.

The physical development of Warwickshire, Worcestershire and Staffordshire IS TO BE OUTLINED BY SIR PATRICK ABERCROMBIE *for the Minister of Town and Country Planning.*

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A Report has been published by an Advisory Panel for the Ecclesiastical Commissioners on POST-WAR CHURCH BUILDING.

This Report, published at 4d. (by post 5d.) by the Press and Publications Board of the Church Assembly, 2, Great Peter Street, S.W.1, contains a foreword by the Archbishop of Canterbury, in which he writes: "The primary object of the Commissioners in appointing an Advisory Panel to report on Post-war Church Building was to obtain the best advice which experience could give for their own guidance in the discharge of their own duties relating to the formation of new parishes and the approval of new churches as fit to become Parish Churches. They wished also to focus the attention of all those concerned in church building upon the problems presented." The Report covers the principles to be applied in connection with sites for churches, types of building, materials, methods of construction, lighting. heating, seating and equipment; and also discusses conditions in the building industry as they affect church building. The Report states: We consider that the Church should strongly support the policy now being advocated by so many town planners of building Churches and other cultural buildings actually at the same time as the houses. Such a policy of church building, if vigorously fostered as an essential part of all housing schemes, would also allow the employment of different types of labour and materials, for it must not be overlooked that church work demands the employment of skilled craftsmen, such as masons, woodworkers, metal workers and glaziers, for whom there is no great demand in housing work. . . . The inclusion on one site of all the buildings required by the wider conception of the social responsibilities of the Church is most desirable. . . . The ideal plan, therefore, appears to consist of an integral and harmonious group of buildings, consisting of the church, one, or possibly two, halls, and the classrooms for Sunday School work, together with the Vicarage, and that the whole should be linked together, for example, by a formal garden or cloister court. As a general rule, such groups would probably be mainly of single storey buildings, but on restricted, enclosed or steeply falling sites, which often occur in closely built-up areas of towns, the arrangement of church over hall is especially suitable. The additional height gained can give increased æsthetic value to the general composition. . . . The east and west ends of a church should have an openness beyond that demanded by mere utility or functionalism. Chancels should not be long and narrow. Aisles may be employed for seating as in the traditional plan, or they may be processional, so that the whole of the seating is in the nave. Consideration should also be given to the provision of suitable and sufficient space for the presentation of religious drama.

At the Daily Graphic Plastics Exhibition. Top, bathroom, designed by Richard Levin, M S I A , and bottom, play-room, by S. P. Jordan, A.R.I.B.A., chief of the Design Section of De La Rue Insulation, Ltd. In the construction of the bathroom, birch wood veneers have been incorporated in the plastic wall panels. In the process of manufacture the wood has taken on the properties of the plastics sheet of which it is part. The original murals by Barbosa are similarly embodied in the plastics sheet. In the play-room, the walls, floor, furniture and most of the toys are plastic. The upper part of the walls, curtain pelmet, window sill and door are apple-green, the dado brown, the window seat vermilion.

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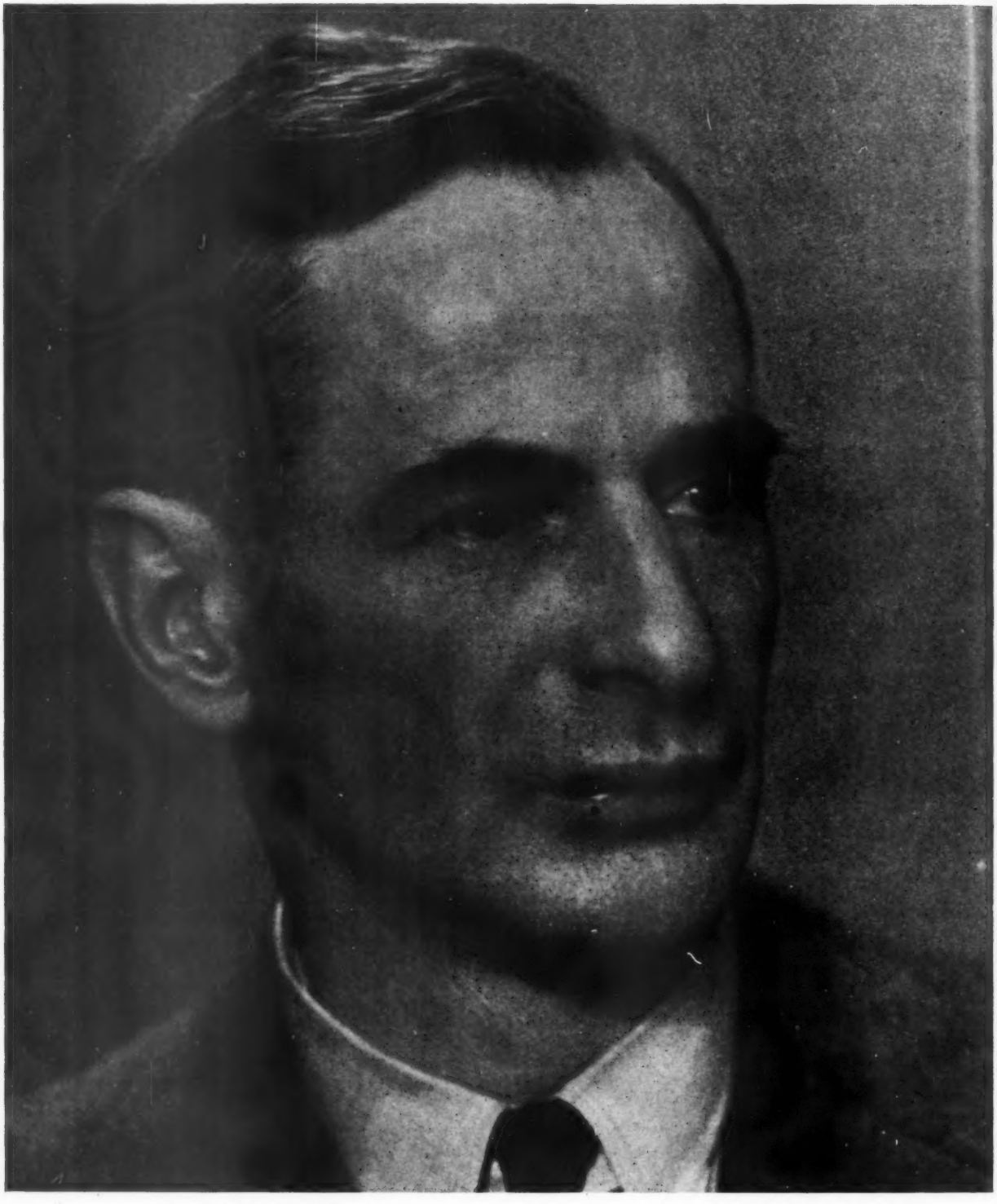
RIBA FINAL EXAMINATION. Relegation in one Subject Only

Up to the present it has been a regulation that unless candidates pass in at least two subjects in Part II of the examination they will be required to take the whole of Part II at a subsequent sitting. For the purposes of this regulation the thesis does not count as a subject of Part II. The Council, on the recommendation of the Board of Architectural Education, has now decided that candidates who pass in one subject only of Part II of the final examination shall no longer be required to present themselves for re-examination in that subject. With a view to assisting ex-Service candidates this decision will operate retrospectively.



Head of British Building Research

Fitting frontispiece to this special number of the A.J. is the portrait of Dr. Lea, Director of the Building Research Station, that official body which is contributing so generously to building knowledge. Dr. F. M. Lea, O.B.E., D.SC., F.R.I.C., was educated at King Edward VI School, Birmingham, and after army service in 1918-19, entered the University of Birmingham. Here he graduated in 1921 and proceeded to M.SC. in 1922 and D.SC. in 1935. He spent a year in 1928-29 as a guest research associate of the Bureau of Standards, Washington, and was chairman in 1940-42 of the Roads and Building Materials Group of the Society of Chemical Industry. Author of many papers and publications on building materials, particularly cement and concrete, he is a Member of the Research Committee of the Institution of Civil Engineers and of the Architectural Science Board of the RIBA. Dr. Lea, who joined the BRS in 1925, succeeded Mr. I. G. Evans as its Director this year. An account of the BRS is given here.

Detailed investigations of five possible sites for the UNITED NATIONS' HEADQUARTERS are given in the Report just issued of the Headquarters Commission.

The Commission was created by the General Assembly to examine in detail sites in New York and Connecticut, with a view to their suitability as a permanent headquarters for the United Nations. The report (HM Stationery Office, 10s. net) contains 143 pages of text with lavish illustrations, including fifteen maps and seventeen photographs. Chapters include detailed investigations of the five possible sites, the basic criteria for the selection of the sites, airport and radio stations, objections presented to the Headquarters Commission by local residents, and details of the land requirements for both offices and private dwellings for United Nations' officials.

The North of Scotland Hydro-Electric Board has engaged Sir Murdoch Macdonald and Partners, engineering consultants, to carry out a preliminary survey of the LOCH SHIN CATCHMENT AREA in Sutherland.

This is the first step towards the development by the Board of the water-power resources of the County. The catchment area of Loch Shin has been estimated to have a potential annual output of approximately 140 million kilowatt hours. Loch Shin, 270 ft. above sea level, stretches 20 miles north-west from Lairg. The River Shin joins the River Oykell a few miles from the head of the Dornoch Firth.

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Ministry of Education Committee on Schools: Local Authorities should increase their technical staffs and EMPLOY MORE PRIVATE ARCHITECTS.

Methods of shortening substantially the 3¼ years taken before the war to build a school are recommended by a committee of experts in a report to Miss Ellen Wilkinson, the Minister of Education (HM Stationery Office, price 4d. net). The committee think it essential to devise and apply methods of school construction, which will make the most economical use of materials and skilled labour while they are in short supply. Other recommendations include an increase in the technical personnel of all grades on the staff of local education authorities, and the employment by authorities of more private architects. In view of the present shortage of architects with a knowledge of post-war school planning and construction it is recommended that the RIBA be invited to arrange suitable courses for architects in this field. It is also recommended that local education authorities should be given discretion to dispense with the submission of preliminary plans to the Minister in certain cases, and should be asked to review, and where necessary, speed up their own procedure. The committee estimates that the 1944 Education Act will require a total building expenditure of the order of £1,000 millions. It suggests as a target spreading this educational building programme over a period of 15 years, allowing an average of £70 millions a year, which at present costs is roughly double the programme in 1938.

RESOLVE THE CONFLICT

IT is commonly believed that there is a fundamental conflict between art and science, thought and feeling, fact and fantasy, that can never be resolved. These two poles of the human mind are certainly not easily harmonized and types like Leonardo, in which the duality has beome perfectly resolved in genius, are rare indeed. Perhaps it is because the architect must develop both objective reason and subjective imagination that great architecture is so hard to achieve, especially in these days of such vast technical possibilities and so unrestricted a grammar of design.

But there is a way out of that confusion which we have inherited from a past when architects, blind to the inter-relation between form, function and technique, achieved in their sentimental and ineffectual efforts merely the banal, the ugly or the ridiculous. The way out is the full acceptance of modern science and method in building, in the faith that intellectual knowledge, far from being an enemy of beauty and romance, can with proper handling become their stimulating friend.

For some reason we have missed the real meaning of science. It is too easy to look at the mass of factual material which it produces, and give up the thought of mastery in despair. It is too easy, when scientific results conflict with ideas of design, to argue that science and art are bound to be in conflict. The point we have missed is that science is not merely a collection of factual knowledge—it is a way of thinking. The fundamental difference between the Middle Ages and post-Renaissance development is simply that—a change in the way of thinking, away from credulous dogma towards scepticism, analysis, logical thought and the desire for experimental proof. Today science is penetrating architectural dogma from every side. Not that we ask for it ; not that scientists are interested in changing architecture ; it is simply that scientific activity now approaches on every side—sociological, physiological, physical, chemical, mathematical and all the rest—and without deliberate intention on anybody's part, the standards by which architects will be judged are changing.

Architecture has for too long lagged behind other activities in the use of contemporary knowledge and the results of research. Building science is, nevertheless, bound to change the very foundations of design, but at present the architect has too trifling a share in the scientific work and scarcely any influence over its course. He must now be able to command the full resources of science, for only thus can his designs be not only fully effective in function but possess also a genuine contemporary æsthetic.

As this special number of the Journal indicates, a start has been made. Though the close contact between architecture and science is only just beginning, and though it is in need of far greater co-ordination, building research has taken great strides forward in recent years. This trend needs every encouragement for, to quote from Professor Bernal's contribution to this issue, " Scientist and artist are not rivals but colleagues, who

have been too long parted and must come together effectively in the common task of building cities which will be worth living in."

The Architects' Journal

13 Queen Anne's Gate, Westminster, S.W.1
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NOTES & TOPICS

BINC CONFERENCE

When BINC, or more correctly, the BINC (which is to my ear too reminiscent of the Voice), held its Annual Jamboree at the Central Hall, Westminster, last week, leading builders, notably Mr. Grosvenor in his reply to the Minister of Health, made the usual point that the voice of the industry should be heard, but as Mr. Bevan rather shrewdly retorted, the voice of the industry speaks rarely with any complete unanimity.

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Speeches from Ministers were much more informative than usual. Mr. Tomlinson gave some figures of employment in the building materials' industry, and said that there had been a net increase of 50 per cent. in this employment from January to September, 1946.

*

Mr. Bevan announced that a programme of houses to be built, and building materials to be produced, in 1947 would be communicated to the industry in the near future. He was beaming all through the third session of the Conference and evidently felt that the situation was now sufficiently eased to announce these figures for 1947 without too great a risk of laying more rods in pickle for the Government.

There was not much doubt that Mr. Bevan carried his audience with him much more successfully this year than last. Then, when indeed the Conference was much better attended, the atmosphere was one of scepticism and curiosity from the floor. This year members of the Conference came to learn, to blow off some steam. and they tended to applaud anything that sounded like an intelligent plan. Sir Valentine Critall put in a plea for more centralized and at the same time more flexible planning. Mr. Hearder advocated plenty of informal contacts between the industries and not only Ministers, but Ministries. He also said that the formal channels of consultation (the National Consultative Council, etc.) were now working smoothly.

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Now and again a discordant note was struck in this great big happy family. Some speakers, including Sir Thomas Bennett, said that payment by results in some form must come, while Mr. Adams, for the operatives, thought that piecework could be dispensed with if working conditions were improved and the operatives made contented.

*

The fourth session was a disappointment because three of the distinguished visiting speakers proved to be in Washington or Brussels. The BINC conference was apparently becoming the ears of the industry rather than the voice, into which Ministers can pour honeyed words of the Government. In Astragal's humble view a voice is not much good without a brain behind it. The distinguished builders who addressed the conference exhibited plenty of individual intelligence and knowledge of problems within their own field, but the industry as such can hardly speak on policy unless there comes into existence a research and secretarial organization that can sift the views of committees into a coherent shape.

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The Conference decided to meet again, but as an organization which now has not even a Journal, it seems in danger of becoming only a sounding board.

SCHOOLS REPORT

In the Report of the Committee on School Sites and Buildings just issued by the Ministry of Education (HMSO, 4d.) a time limit of 15 years has been set to spend £1,000 million. As the *minimum* time from the initial consideration to the ceremonial opening of a school under the most favourable conditions is 3¼ years, the Committee not unnaturally felt some speeding up is needed.

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Among the recommendations made by the Committee are the fixing of a time limit for negotiating the purchase of a site by negotiation before compulsory purchase is adopted, a speeding up of the Ministry's procedure at various stages, a suggestion that the RIBA be asked to conduct courses for school architects and that more private architects should be employed. A very sensible report.

DESIGN IN THE FURNITURE TRADE

Most of the dailies, in commenting on the Furniture Trade Working Party's report, have concentrated mainly on the revelations about the sweat shops and their black market activities and have missed the remarks in the Report about furniture design in general: "The majority of the furniture . . . was of poor design: the inhabitants of industrial towns should not be fobbed off with ugly things: . . . no excuse for a retrograde design policy."

*

You think these strictures pale and unemphatic? Quite: but we must remember that the working party is reporting in the language of custom and convention to the President of the Board of Trade. The specific recommendations for a design centre for the furniture trade and a National Furniture College are both excellent in themselves, though they will need statesmanlike management if quarrels among the contributors are to be avoided.

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But it is encouraging that the working party, which includes many high-ups in the retail and manufacturing sides of the furniture trade, should have signed (apparently unanimously) a report admitting that much is wrong and that something must be done about it.

ASTRAGAL

In this special issue of the Journal, a number of architects, scientists and others connected with the building industry have contributed to a series of articles dealing with research in building. Hitherto building has been the least scientific of activities and modern knowledge has been applied but slowly and reluctantly to its development. But this symposium indicates that, though much remains to be done, a more inquiring and experimental attitude to the art of providing human shelter is developing. Here the present state of organization of building research is reviewed at the national, departmental and private levels. Next comes the human side of building research followed by the problem of disseminating knowledge. Opinions on building research by different users are then expressed, and Professor Bernal concludes by indicating where and why Architects and Scientists should meet.

SCIENCE AND RESEARCH IN BUILDING

I: NATIONAL ORGANIZATIONS

IN GREAT BRITAIN AND THE EMPIRE.

By A. L. Gardner, M.A., Librarian, Building Research Station.

The various bodies whose work contributes either directly or indirectly to the advancement of building science may be grouped as: (1) the Government organization (Department of Scientific and Industrial Research); (2) the Industrial Research Associations, operated by the industries themselves with financial assistance from the Government; (3) the Universities; and (4) individual industrial firms.

It would not be possible to give anything like an exact quantitative statement on the amounts of work to be attributed to each of these sources, but the following remarks may be taken as a rough guide on this aspect. Over the field as a whole, most of the research done directly on building problems is carried out by the Government organization. Besides this, certain of the Industrial Research Associations do valuable work, both of fundamental and applied nature, on the properties and uses of their respective materials or products in relation to building: mention may be made of the Research Association of British Paint, Colour and Varnish Manufacturers; the British Non-Ferrous Metals Research Association; the British Iron and Steel Federation (British Iron and Steel Research Association); the British Coal Utilisation Research Association; the British Electrical and Allied Industries Research Association; and the British Refractories Research Association. The Universities, apart from their contributions to the general science on which all applied science is founded, also carry out occasional researches on building subjects either independently or on behalf of the DSIR; the volume of work done in this way has hitherto been relatively small, but is increasing. Some private firms carry out research to a greater or less extent on materials in which they are interested, but much of this is naturally devoted to the manufacturing aspects, and it is not in general linked organizationally to that carried out by other bodies.

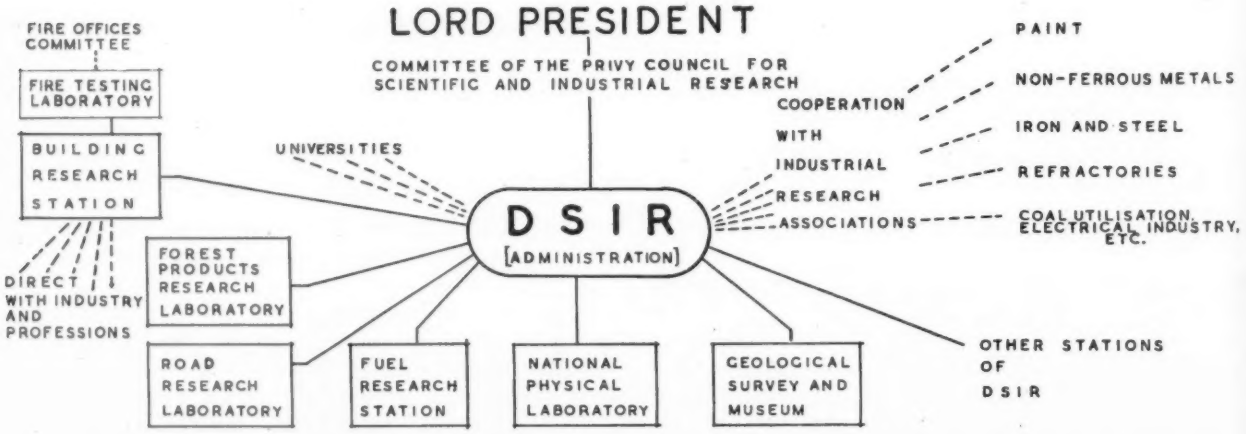
Thus in the main a description of the organization of building research in this country resolves itself into a description of the organization of Government research on building. The nucleus of the DSIR organization so far as building is concerned is the Building Research Station, which originated in the aftermath of World War I. Starting with physical, chemical and engineering investigations of the properties of building materials and structures, the BRS has in the past two decades contributed a great deal towards introducing scientific methods in place of the traditional and empirical methods by which these subjects had hitherto been treated. Its progress in this task has been facilitated by its position as one of the research stations of the DSIR, for within that Department there are several other establishments which, although not primarily concerned with building research, are particularly well equipped to deal with certain aspects of the problems involved. Such establishments include the Road Research Laboratory, with common interests in problems concerning bituminous materials, concrete and soil mechanics; the Fuel Research Station, which collaborates on heating problems; the Forest Products Research Laboratory, whose work on timber is closely associated with the BRS interest in the structural uses of timber; the National Physical Laboratory, which frequently carries out, on behalf of the BRS, laboratory tests to determine the fundamental physical properties of materials used in building; and the Geological Survey and Museum, which collaborates with the BRS on questions of location, supplies and types of the mineral raw materials from which most building materials are manufactured.

Research is also carried out by the staff of the BRS at the Fire Offices' Committee's testing station at Elstree.

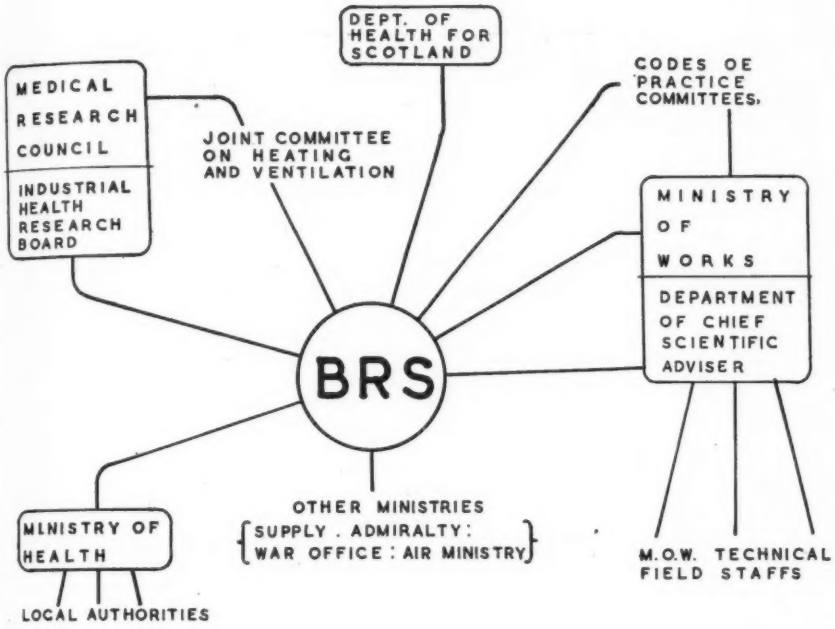
The benefits to the work of the BRS arising from the close co-ordination of the Research Stations within the DSIR is supplemented by the co-operation which is maintained between the Department and the Industrial Research Associations mentioned above as being engaged on research which has applications to building.

An outline of the DSIR organization as far as it is concerned with building is shown diagrammatically below. The Department is administered by the Lord President of the Council, through a Committee of the Privy Council for Scientific and Industrial Research. Scientific guidance is provided at departmental level by an Advisory Council, appointed by the Lord President from among the country's leading scientists and industrialists. In order to ensure that the research work undertaken at the various establishments is closely related to the problems and realities of industry, each of the research stations operates with the advice and guidance of a Board which is capable of ensuring that this end is achieved—in the case of the BRS, the Building Research Board consists of men having a wide practical knowledge of the building industry, under the chairmanship of Sir George Burt.

Close liaison must, of course, be maintained with other Government departments concerned with building. The Departments principally affected are shown opposite. Special mention should be made of MOW and MOH. The creation of the department of the Chief Scientific Adviser



Organization of the Department of Scientific and Industrial Research in Relation to Building Research.



Links between the Building Research Station and other Government Departments concerned with building.

in MOW has as one of its objects the provision of a channel through which MOW architects and engineers can readily obtain the results of building research; and through which the scientist can obtain the results of the field experience of the staffs of the largest building concern in the country. MOH is important to building science because it provides a main link with local authorities and it has the prime responsibility for design for subsidised housing and for byelaws. In Scotland the functions of both these departments fall substantially to the Department of Health for Scotland, with which also the BRS has close links.

In discussing the organization of building research we have so far considered building research mainly as a means of gaining knowledge of properties of materials and methods of construction. Historically, this was the approach to the subject, but of recent years it has been increasingly recognised that this alone is not enough. More and more attention is being turned towards the study of human requirements, and of the building considered as a place in which to live and work. Some of these problems have figured in the research programmes of the BRS for many years, *e.g.*, problems of heating, daylighting and sound insulation, and much increased attention is now being given to the general study of the functional requirements of buildings. This trend towards the "human values" approach has received considerable impetus from the establishment of the Chief Scientific Adviser's department in MOW, and as a result fresh links are being forged in the organization of building research, using the term in this wider sense. The answer to many of these user problems can be found only by using research methods which go outside the laboratory, and the work of devising the necessary new techniques and of applying them is actively engaging the attention of the CSA's department, with the co-operation of the BRS. Moreover, the greater the emphasis on the "user" aspect of building research, the more the physiologist is brought into the picture; one can therefore expect the links between the Medical Research Council and building research to be further strengthened—a process which has already begun to take place.

Although in the past the Dominions and Colonies have not prosecuted building research as a distinct branch of applied science, most of them are now taking steps to remedy this omission, and in some cases the broad lines on which the problem is to be attacked are already becoming clear.

Taking first the Dominions, we find that in Australia, and New Zealand and South Africa a start has been made by setting up new experimental building stations. Since much of the work done in Britain is applicable also in the Dominions, an important feature of the organization is the maintenance of close liaison with building research in this country. This is ensured through the medium of the Dominions' Scientific Liaison Officers in London, and also by direct contact between the organization at home and abroad. In Canada, a scheme is being developed by the Canadian Ministry of Reconstruction, under which a central body will formulate the problems and invite existing organizations to undertake the research on subjects for which they are especially well equipped.

The Colonies have building problems which are specially dependent on local conditions. In most of the Colonies a major problem is the development of methods of using materials locally available, particularly for house construction. In a number of the Colonies a considerable amount of work has already been done in this field, but with the exception of a joint effort of East African colonies in the form of the East African Industrial Research Board, the work done in the different colonies has not been co-ordinated. The Colonial Office has been devoting considerable attention to the question of the organization of building research in the Colonies, and it is to be anticipated that a scheme will be evolved under which the colonies will be encouraged to do the essentially local part of the work while receiving all possible assistance and guidance from the mother country.

IN THE UNITED STATES. *By George L. Reid, Housing Attache, US Embassy, London.*

As in most other countries of the Western world, much building construction in the United States has been slow to turn to organized research for a solution to its many problems. The building industry has been made up of so many almost detached industries and businesses that rationalization has been much retarded. Many of the basic activities in building construction which still play an important part in almost all building, such as the production of masonry and the assembling of timber frame construction, are carried out by the same artisans with much the same tools as they have been for several generations. Because of the divided responsibility of the many trades, the builder, the architect, and the

wide variety of material and appliance manufacturers, little that can be called organization in building research has yet emerged. Building costs have been steadily rising, in part because of the higher standards of convenience and amenities demanded in buildings but also to a considerable extent because the advantages in cost resulting in other consumer goods from organized research, development and mass production have been slow to appear in the building construction field.

Progress in research and development has been much more noticeable in the field of the separate building materials and appliances incorporated into buildings than it has in the buildings themselves. Research into both materials and production methods, conducted for the most part by individual industries and to some extent by industry groups and trade associations, has accomplished important improvements in the products; better standardization; and noticeable saving in the manufacturing costs, some of which have resulted in reduced cost of materials in the buildings. However, the great housing push, which is the outstanding characteristic of the building construction situation in the United States today, is tending to concentrate a great deal of attention on the cost of the finished product, that is, the house, and on the serious rise in the cost of houses. It is probable that more time and energy is being devoted to both building research and development today than ever before.

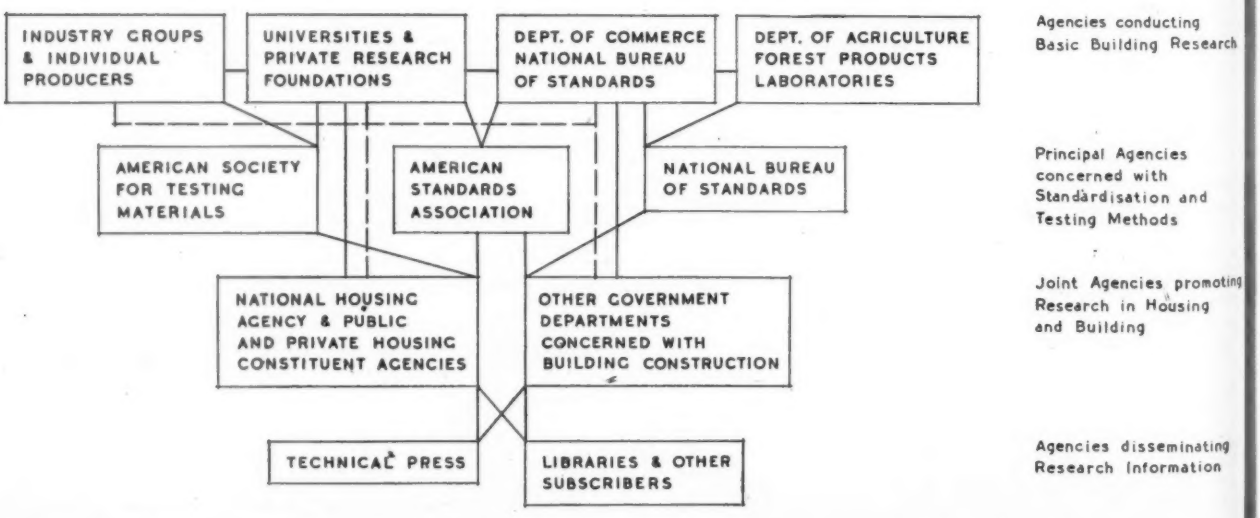
The part which the Government has played in research in the housing field in the past and the anticipated participation in the near future is rather small, in view of the tremendous efforts being put forth by industry groups, individual industrialists, institutions, research and development foundations, prefabricators, and appliance manufacturers.

For the most part, the Government concerns itself, at least insofar as housing is concerned, with the stimulation of research and development among these several other agencies; with the evaluation of the results of these developments and the establishment of criteria, standards, and testing methods. As regards building construction, and especially housing, three Government agencies are outstanding in their contributions.

The Department of Commerce has for many years maintained the National Bureau of Standards as a testing and research organization covering a very broad field of materials and devices. In recent years standardization on building materials and tests of new materials and developments has been a considerable part of the Bureau of Standards' work. This organization has undertaken from time to time basic research and study programmes sponsored and financed by the National Housing Agency, the Federal Public Housing Authority and the Federal Housing Administration. In many instances other Federal Government agencies, such as the Public Building Administration, concerned with all types of Federal buildings, post offices, prisons, Federal office buildings, etc., the Army, the Navy, the coastguards, etc., have participated in both the sponsorship and finance of such research programmes. These studies frequently result in a standard Federal specification for the material or product involved, which specifications, when they are established, govern all Federal procurement of products or components covered.

The Department of Agriculture maintains at Madison, Wisconsin, the Forest Products Laboratory, which has contributed importantly to developments in the use of lumber and lumber products and has accomplished much in the field of plywoods and stressed-skin building members. The work of these Federal agencies, however, does not compare in volume with the work done by industry groups such as the Portland Cement Association, the American Institute of Steel Construction, the National Lumber Manufacturers' Association, and many others, or the research and development work done by individual manufacturers such as the Truscon Laboratories, the Great Lakes Steel Company, the United States Gypsum Company, the Masonite Corporation, and many others. Both the Government agencies above mentioned and individual industrialists frequently conduct their research and development work, utilizing the staffs and equipment of educational institutions and private laboratories. Many of the Universities throughout the country frequently undertake such research and testing work under much Government sponsorship and finance, or private industry sponsorship and finance, as their particular experience and equipment will permit.

The number of Universities which contribute to the advancement of building construction through their research and testing work is too great to list, even those outstanding in the field. Of almost equal importance with Government and industry contributions to developments in the building field, as well as, of course, in other fields, are the contributions of technical associations and societies who, through their Committees, which so frequently consist of outstanding scientists and engineers from Government, from industry and from private practice, concern themselves with testing and standards. Such organizations as the American Standards Association, the American society for testing materials, has discharged important responsibilities over a long period of years and has developed enviable reputations for objectivity and reliability. Its findings more often than not are accepted



Organization of building research in the United States. The solid lines show the flow of research information; dotted lines show the flow of financial assistance.

by Government, industry and private consultants alike.

The dissemination of the fruits of research and technical advance are as varied as the sources from which these derive. Some of the national agencies as the National Housing Agency Technical Division, publish digest bulletins. The National Bureau of Standards distributes formal reports on its activities. Most of the industry groups publish either *ad hoc* reports or periodical reports of their technical work and the technical press, which quite generally has a publication in each field, contributes importantly.

In conclusion, it might be said that Government agencies outside the military tend more to finance and otherwise promote the work of research in the building field rather than to conduct or direct such research. Quite generally, industry looks to the Government and to private associations for testing procedures and standards, and as yet there has not emerged any centralized organization surveying the entire field of building construction with a view to integrating research and development efforts.

IN SWEDEN. *By Nils Tengvik, M.A., Civil Engineer, Stockholm.*

For a long time building research has been carried on at the Royal Technical University in Stockholm and at Chalmers' Technical University in Gothenburg. Minor state grants are available for this research. Investigations in the building branch, which can be included under this heading, have for some time been carried out also at the Government Testing Institute.

The Technical Government Offices, which include the Building Board, the Hydro-Electric Board and the Highways and Waterways Board, have often found occasion, *e.g.*, in connection with planned building works, to carry out research. They have also appointed two special commissions with the function of proposing revised codes for concrete and steel. This revision naturally involves testing and investigation, often on a large scale.

Another Government institution, the Royal Government Institution for Owner-Occupiers, whose aim is to improve housing conditions in rural areas, is conducting inquiries on such matters as water and drainage in the country, and communal wash-houses with mechanical appliances.

Scientific, technical and economical research in the geophysical sphere is conducted by the State Geotechnical Institute, whose chief function is to deal with questions on the pressure, stability and deformation of soil and other masses, and on erosion, subsoil water, etc.

The State Committee for Building Research, which was set up in 1942, has the following duties:

(i) To follow and promote technical-scientific research in building as well as to organize co-operation of research between the various interested parties.

(ii) To take the initiative in building research.

(iii) To arrange for the systematic collection, ordering and compilation of existing knowledge in the building sphere, especially material which has been produced on this subject by state-aided research, as well as to take the necessary steps for the publication and use of such material.

The Commitee consists, in all, of 21 members, besides the Chairman. The members represent the technical universities and the technical Government offices, as well as certain technical associations and unions among employers and workers in the building trade.

Beside special grants to cover the costs of the secretary's office, etc., the Government has hitherto made a general grant of 200,000 Swedish kronors per financial year for building research. These grants are distributed by the Government in accordance with the motions of the Committee. In cases where the research work is regarded as of very special interest for certain local authorities or private undertakings, contributions are made by local governments or private groups.

Hitherto, the Government, in accordance with the Committee's motions, has granted sums amounting to approximately 750,000 Swedish kronors towards some 75 investigations in different sections of building.

As shown by the accompanying table, research grants are grouped in three main departments, namely, General Building Technique, Applied Building Technique and Production Technique. The last-mentioned term comprises such inquiries, on technical-economic lines, as may help to further the rationalization of the building trade, especially in house-building. More than one-third of the grants have in fact been allocated hitherto to the house-building section. It may be expected, however, that most of the results from research work falling under General Building Technique and Production Technique will redound to the benefit of house-building.

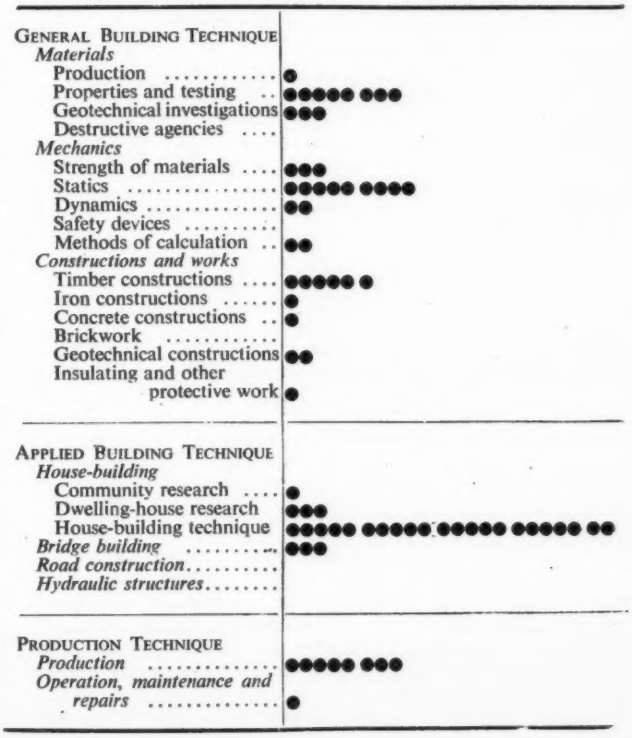
The table also shows how the research grants are distributed among the different sections of the main departments. The Committee has hitherto chiefly supported technical or technical-economic research, whereas questions affecting the human factor in relation to the community and the dwelling have been discussed only to a minor extent, partly because these questions are being investigated by other bodies.

A committee on the social aspects of the housing question has been appointed by the Government to assist in inquiries on the extent and nature of slum dwellings, and on what measures should be taken to eliminate their evils.

The Housing Commitee has been set up by the National Association of Swedish Architects and the Swedish Sloyd Society, partly with the support of state contributions, for the purpose of studying the planning and fitting-up of small dwellings, chiefly town flats, and of laying down space and equipment standards. Such standards, both from functional and economic points of view, are badly needed, as is

THE SWEDISH STATE COMMITTEE FOR BUILDING RESEARCH

Tabular Summary of Research Grants up to February 1, 1946



shown in detail by the Committee; their lack also prevents rationalized production.

The Home Research Institute, also partly supported by state contributions, represents the four large housewives' organizations in Sweden. The work of the Institute comprises several branches: economy, social psychology, hygiene, technical questions, etc. In the technical branch, for example, various kinds of domestic work are studied: cooking, tidying, washing-up, needlework, washing of clothes and care of children. In rural homes, of course, there are additional kinds of work, such as milking, carrying of water and firewood, etc. In each of these branches the methods and organization of the work, as well as the nature of the place of work in height, area, progress of work, body position, etc., are studied. In addition, time studies of the work are made.

For the study of the special building problems in rural districts, there are two Swedish committees, whose work is entirely defrayed by state grants:

(i) The Agricultural Building Study Committee, which ascertains, by means of work studies, whether the methods and planning of work within the field of agricultural building are satisfactory or not, and it submits proposals for the rationalization and lowering of cost of such building.

(ii) The State Research Committee for Farm Buildings, by scientific research and practical tests, promotes the proper construction of farm buildings, in relation to building costs, hygiene and economy of labour. It also investigates the adjustment of agricultural production to building economy, and by systematic collection, ordering and compilation of existing knowledge of farm building, it publishes and makes available results of experiment and research.

The Swedish Standard Commission, Building Section, has the purpose of trying to reduce building costs through standardization. Its work is defrayed almost entirely by state grants. The particular problems with which it deals are standardization of joinery and sanitary ware, and modulus investigation.

For the principal building materials, namely, concrete, bricks and wood, special research institutes have been established.

The Cement and Concrete Research Institute is supported by the cement and concrete industry. The work of the Institute is organized in three departments—chemical, physical and technical.

The Central Laboratory of the Brick Industry devises means to remedy working difficulties and to bring about improvements and more rational methods of production at the brickworks. The Laboratory also has a section for technical building research.

The Forest Products Research Institute, partly supported by state grants, has a technical section for investigating the physical properties, drying, preservation and surface treatment of wood as well as its mechanical working.

2: GOVERNMENT ORGANIZATIONS

THE BUILDING RESEARCH STATION.

By William Allen, B.Arch., A.R.I.B.A., of the Building Research Station.

The Building Research Station was established shortly after the last war as one of several new laboratories set up under the new Department of Scientific and Industrial Research. At first it concentrated, as one would expect from its genesis, upon improvements in materials and methods of building construction, though it was not long before attention was directed to physical problems such as acoustics and heating. Largely through these it first found intimate contact with architectural ideas, though the interdependence of architecture and the whole of building science had for some time been recognised, of course.

Its organization from the outset has been unique in important respects. It has certain natural scientific divisions, chemical, physical and engineering; but they were never divisions in the sense of being divided from one another, and recognition of the fact that most building problems need to be studied comprehensively to get an answer that means anything in practice has succeeded in nearly obliterating any sense of division whatever. Essentially, the science side is one unit, not three; and in the interest of efficiency every effort is made to foster unity. This is where the Station finds much of its strength.

Another important development was the establishment of a section midway, as it were, between the scientific groups and the Industry (taking that term to include professional bodies such as the architects). In the early days when the industry and science were much farther apart than now, this Section was to some extent a bridge between the two; but it has always responded to changes in the relationship between science and the Industry, and now, as at present organized, its main functions concerns Codes of Practice (for which the Station bears a large responsibility), inquiries (always one of its main functions) and the Station's particular services in connection with housing.

A third important side at the Station is the library, which has been built up in intimate association with the laboratory activities. This is distinguished by a fine translation service which provides for the scientific staff a continuous and remarkably good picture of world-wide developments in all subjects of interest to the Station. All the important building journals are to be found there, and translations are made from every major European language. Some idea of the scale of the work can be obtained from a recent effort in which some 20-odd books and major papers in Russian were translated in whole or in part for the Department's District Heating Committee. Naturally the wide knowledge of European and Eastern building which had been built up at the Station provided much useful material for war purposes in recent years.

The library prepares abstracts of all papers thought to be of interest outside and issues them monthly in the form of the Building Science Abstracts, published by H.M. Stationery Office.*

Perhaps a word here about the work of architects at the Station would complete this preliminary description. In the early days the architectural corps was very small, mainly due to the difficulty of finding the best way to use architects in co-operation with scientists. Subsequently the corps had grown, especially in recent years, as the Station has increased its interest in problems having a direct bearing on the design of buildings. Indeed, the pace at which the architectural corps now grows at the Station is now the pace at which suitable personnel is found. The most significant step in this direction has been a recent reorganization in which the physicists are formally associated with the architects on equal terms for studies of the classic architectural problems of

* Obtained by subscription at 19s. 0d. per annum.

lighting, heating, acoustics, and so on. The building science laboratory has always been a strong potential nursery of modern architecture, but historically has never been able to fulfil this function properly; now it looks as though this will develop rapidly. A great architectural opportunity is opening up.

The flexible nature of the divisions of the Station has sometimes made it difficult for visitors to grasp the organization of research, and when one comes to write something of the work of the Station, one has to do so mainly in terms of the problems rather than the scientific divisions.

Of building materials, for instance, one could catalogue them and one would find that the catalogue would appear to be more or less a catalogue of the work of the Chemistry Division. But then one would shortly discover that emphasis in the research rests not upon materials as such but upon their natural properties, some of which, being mechanical and physical, carry the studies well beyond the confines of orthodox chemistry. The real way to understand the work of the Station in this field, therefore, is to catch the significance of these natural properties.

They also provide, of course, the real key to architectural mastery over the use of materials in practice, and have a close bearing upon the development of the modern vernacular of design. We have heard much in recent years of structural continuity, and architects have somewhat too easily extended the idea from its legitimate engineering application to other aspects of structure where it comes into conflict with these natural laws. For instance, there is the idea of the uniform, plane, smooth surface from which a certain aesthetic satisfaction is derived on account of these characteristics. But this is often attempted in the face of the influence of temperature differences, shrinkage movements, settlement, and so on, which will cause every building of any appreciable size to undergo almost continuous dimensional change in detail and as a whole, throughout its life. We cannot claim to have adjusted the vernacular of modern design to such forces, and until we do we will have trouble with our buildings.

What, then, are the main points? Plastic flow, which occurs prominently in concretes, asphalt and timber; reversible moisture movements such as take place in timber and products incorporating timber, and in concrete products; shrinkage, which is an important factor in concrete, rendering, plastering and clay soils; and thermal movements, occurring to a different extent in different materials (but always occurring in all of them). In a slightly different category we have the chemical constituents of materials, which sharply affect their use in combination; most chemical reactions require the presence of moisture, and in an island climate such as ours chemical reactions are bound to be frequent and rapid in buildings. They are, in fact, at present one of the most prolific causes of building failures, and this ought to warn us not to depart from design which is naturally protective without being pretty sure of our chemical factors. Finally, one should mention the weathering properties of facing materials, always an important aspect of Building Research Station work.

There are other studies one might mention, but these will serve for illustration. At the same time one should say that the fundamental research is usually done with the object of improving our knowledge of specific materials, and the Station is naturally conversant with all the orthodox types as well as most of the unorthodox.

Apart from its significance in building design, the work on materials plays an important part in industrial development, instances of which are found in co-operative researches on sand-lime bricks, and in the use of blastfurnace slags, from which, comparatively, very large financial returns have been derived. In another direction, the Station assists in selecting and specifying materials for special uses—for example, the stone for the repair of the House of Commons, which raised very awkward problems resulting from the requirements of appearance and chemistry. In fact, the repair and maintenance of ancient buildings is no inconsiderable side line. The cleaning of buildings in urban atmospheres is another specific aspect of the study of materials.

In this discussion we have already of necessity wandered into part of the work of the Engineering Division, but, of course, the central studies in that Division are structural and concern particularly the mechanical properties of elements and methods of construction. Examples are work on reinforced concrete (which played a large part in the development of the important Code of Practice published some years before the war), work on steel frames, and on reinforced brickwork. More recently a special team was built up to deal with the immediate problem of alternative methods of house construction. Because of its topicality, this is worth describing in a little more detail to illustrate how the Station works on a new interest from first principles.

Before the war, the orthodox brick-built house automatically had such a large structural factor of safety that there was no incentive to study its problems. With the development of new systems, particularly of the frame-type, the problem arose at once of providing a basis of design which would meet the needs of economy and safety. A particular aspect of the problem was to find the contribution made to stability by elements like the stairs and the cladding, as well as the partitions and floors. The team embarked on studies along two main lines, the general field testing of the prototypes of alternative forms of construction, and the detailed examination of full-scale frames erected on a special test bed at the Station. Much special equipment had to be obtained, of course, among which an outstanding item was a new mobile electrical laboratory. As a result of all this work it has been possible in the course of eighteen months to arrive for the first time at a reasonable and comprehensive group of acceptance criteria for the structure stability of houses.

It is in accordance with the flexible organization of the Station that the limits of the Engineering Division should be modified as necessary to accommodate what may be described as peripheral subjects. Thus one of the major new developments—the study of Soil Mechanics—has grown from it, though its antecedents are as much physical as mechanical. Architects are somewhat prone to regard what goes on beneath ground level as being acts of God rather than the rational behaviour of materials amenable to precalculation; but such is now the case with soils, and the work of this section is partly devoted to the study and development of foundations for buildings. However, much fundamental research is done, as one would expect, and accordingly its influence extends to large-scale civil engineering works such as dams, docks and harbours, and touches, too, upon the academic field of engineering geology. Another division of the Station closely allied to engineering is the Mathematical Division, though its work extends to problems arising throughout the Station.

A very recent development at the Station has been a joint architectural-scientific attack upon mechanical plant for house building and other similar work. The prime responsibility for the study now rests with the Engineering Division, which works in close co-operation with the Chief Scientific Adviser's Division at the Ministry of Works. A topical example of the work of this section has been development work in association with an outside firm to produce a rising scaffold. As a result, a climbing scaffold jack is about to be marketed which appears likely to solve, for the first time, the classic problem of always having a scaffold at the optimum height.

Turning to the work of the Physics Division, one finds now, as mentioned earlier, a formal association of architects and scientists on equal terms. The core of their studies is formed by the classic group, light, heat and sound, though the field is so large in these subjects that good contacts have to be maintained with such bodies as the National Physical Laboratory, where many of the studies have been made—specially those of a more purely physical character—and with the Medical Research Council on physiological and psychological aspects. The essence of the light-heat-sound groups lies, of course, in the fact that ultimately the criteria are mostly those of the human body, and since changes in this do not lie within the scope of normal design practice,

the latter has ultimately to conform to the former. The new developments should lead, during the next few years, to the establishment of physiology in an important position among architectural studies.

During the past two or three years the main part of the Division's work has been related to three of the Post-War Study Reports—the Lighting of Buildings, Heating and Ventilation, and Sound Insulation and Acoustics, and subsequently the Station has taken a major part in helping to get the recommendations carried out in new house types. As a result of the co-operative efforts of the Station, the National Physical Laboratory and the Ministries of Health and Works, it looks now as though a great improvement in such matters as the heating and heat insulation of houses and the sound insulation of party walls is being effected in our housing. Indeed, the standard of sound insulation which is being aimed at—and reached—is higher than has been obtained anywhere in the world on any appreciable scale outside a laboratory.

Another activity—the study of natural lighting, particularly in relation to town planning—has given this subject a firm place in urban development studies, and much useful co-operative work has been done jointly by the Station and the Ministry of Town and Country Planning.

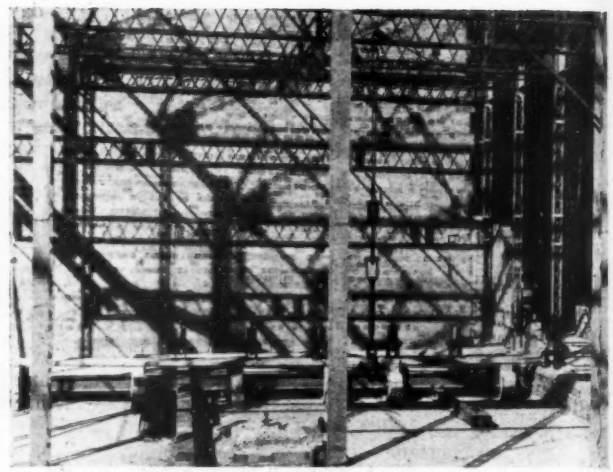
The responsibility for work on fire protection also lies with this Division. The studies have important economic ramifications, and touch widely upon building construction, planning and site development. The Fire Offices' Committee is associated in the work, and the researches are carried on at a special laboratory at Elstree.

In addition to the three main groups, the Chemists, Physicists and Engineers, there are two small but growing sections, as yet unattached to the major ones. The first of these, which deals with plumbing and drainage, concerns itself with the principles of design, materials, and labour economy. The second section is the nucleus of a group to study economy in building, its first tasks being connected with time-and-motion studies, or, better, method studies. These impinge upon the size and shape of individual products, the organization of building works, and so on. These particular inquiries are closely co-ordinated with work in the Chief Scientific Adviser's Division of the Ministry of Works. Related to this development is a recent extension of the Station's direct building work. A 50-acre site has been purchased for large-scale experimental building projects, the first of which is a group of twenty houses.

Finally, we come to the division dealing with inquiries, Codes, etc., through which most of the Station's information is tapped for ordinary professional purposes. Some of the outlets are indirect, the most important of which is the Codes of Practice work and assistance in the preparation of British Standard Specifications. The general structure of the Code organization has been amply described in the press, and here it is sufficient to say that the Station provides servicing officers on the majority of the Committees dealing with the specific aspects of building, and is largely responsible for what are called the Functional Codes. Another important outlet is *via* publications such as *The Principles of Modern Buildings*, Vol. I of which came out just before the war.

A major part of the Division deals specifically with housing problems. Its history deserves a few words, because it illustrates an important new type of development.

It was established as a separate entity in the middle of the war, and its first work was to make a survey of the alternative house types erected after the last war. No adequate study of them had ever been made, and it was felt that this was the proper way to begin preparations for this post-war period. The second stage was to determine a comprehensive set of functional standards so that we would have yard sticks with which to measure alternative types of construction. The greatest single source of weakness after the last war was the absence of criteria for new houses. Of course, the setting of standards was a task which in most cases could not be done properly without adequate discussion among the related interests, and this therefore became a part of the duties of the



Three photographs exemplifying some of the work of the Building Research Station. Top, apparatus designed for studies of rain on roofs ; the slope of the roof can be altered and the rain can also be driven by a wind. Centre, measurements being made of the deflection under vertical load, of a steel frame for an alternative form of house construction. Bottom, study being made of temporary air-stripping for housing sites to keep them reasonably clean during construction.

group of Post-War Study Committees formed under the ægis of the Ministry of Works. In due course most of the standards and the results of the survey of the post-last-war houses were incorporated in the first Report of the Burt Committee, which is the Interdepartmental Committee dealing with alternative types of house.

The next problem was to see that the alternatives came up to the desired standards, most of which were founded partly, at least, on very recent and advanced researches. The standard of sound insulation for party walls, for instance, rested almost entirely on new findings. It was clear, therefore, that designers would often have to be given special help, and it was arranged that whenever a promising scheme was put forward to the Burt Committee, the assistance of the Station should be available to the designer in every way necessary to enable the prototype house to reach the desired standards. This work has involved the detailed study of over a hundred new schemes. In subsequent tests of many of the prototypes it has become clear that in the main the new standards are being reached, and therefore there is every reason to expect that the alternative houses built after this war will in many ways not only equal but surpass even unusually good pre-war houses.

Now finally we come to the means by which the day-to-day inquiries are handled.

It is, of course, open to anyone, layman or professional, to address an inquiry to the Station, and just before the war the annual number of these had reached between three and four thousand.

The policy which guides the replies to inquiries can be quite specifically put down as follows:—

(1) If the answer can be put conveniently in a letter, and involves no laboratory work or visits to the site, no charge is made.

(2) If laboratory work is required, a charge is made *pro rata*, and if a site visit is necessary, together with a report, a fee is usually charged on the same general basis.

(3) The Station is not normally willing to carry out routine standard tests where professional consultants and facilities are available outside.

(4) Where the inquiry concerns a product which the Station has examined for the manufacturer, it is usual to refer the inquirer to the manufacturers for the information, although the Station reserves the right to use the results of such tests when necessary.

The Station is, of course, prepared to receive visits from inquirers by appointment when they feel that this is the best way of getting the information they want.

In addition to these services, every effort is made to accommodate any reasonable request for other kinds of help, such as the examination of drawings or specifications, or collaboration in design where special problems are being dealt with. In fact, it is a major concern on the part of the Station to make its knowledge as widely available as possible, and it welcomes any kind of opportunity to do so.

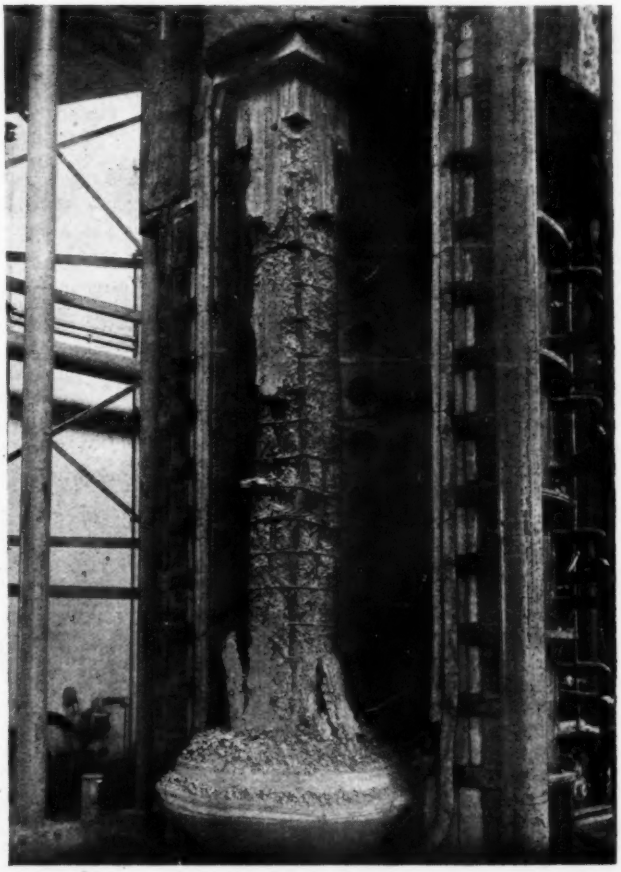
At the same time, it is equally anxious to have information from practising builders and architects, and to draw to the fullest extent on their experience. The various professions serving the Industry, therefore, have a great opportunity to help the Station in this respect.

After this picture of the Station's work—and it is a very sketchy picture—one ought by way of summary to draw attention to one or two rather salient features about the way the Station works. One ought, for instance, to point out that it is one of the several examples in the Department of Scientific and Industrial Research of the Combined Operations technique. This is a development in scientific organization which has paid, and is paying, handsome dividends, but no other country in the world as yet tackles its building problems in the comprehensive way which has become the tradition at the Building Research Station. At the same time, there is no other way by which the problems can be solved in any reasonable time, for part-answers mean nothing to building practice. A solution must satisfy all the main requirements or it will be found wanting. It is the constant aim of the Station to see that its work has this practical character.

FIRE RESISTANCE. *By T. W. Parker, M.Sc., Ph.D., F.R.I.C., of the Building Research Station.*

Although elementary precautions against damage or destruction of buildings by fire have been taken for centuries, the systematic investigation of the behaviour of building materials and structures when exposed to fire, dates only from this century in this country. Continuous work in any considerable volume dates, in fact, only from 1934, when a Fire Testing Station was built and equipped by the Fire Offices' Committee at Borehamwood to enable tests to be made on walls, floors and columns in accordance with the test methods drawn up in a British Standard for Fire Resistance (B.S. No. 476) in 1932. By arrangement with the Fire Offices' Committee, the Building Research Station undertook the responsibility of carrying out the standard tests and issuing certificates of performance at this laboratory and were also enabled to use its facilities to put in hand research programmes on fire resistance.

The research programmes follow a number of directions, all of which are of direct interest to architects in that they relate to the choice of suitable materials, the planning and design of buildings, and even planning of a number of



The result of a laboratory test on the effects of fire on a reinforced concrete column.

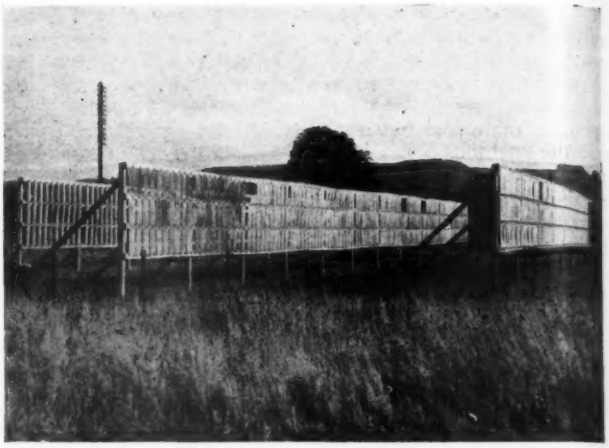
buildings on a given site. A building which is easily destroyed by fire is not only a hazard to life of the occupants but may, in congested areas, lead to the fire spreading to adjacent buildings, causing further hazard to life, apart from the material loss involved. The choice of structural elements sufficiently resistant for any given circumstances is therefore important, and the provision of data on the relative behaviour of various structural elements has so far taken up a large part of the research work. A typical example to illustrate this can be drawn by considering structural steel columns. Such columns, if unprotected, have little resistance to the effects of fire, but this behaviour can be greatly improved by the choice of suitable encasements.

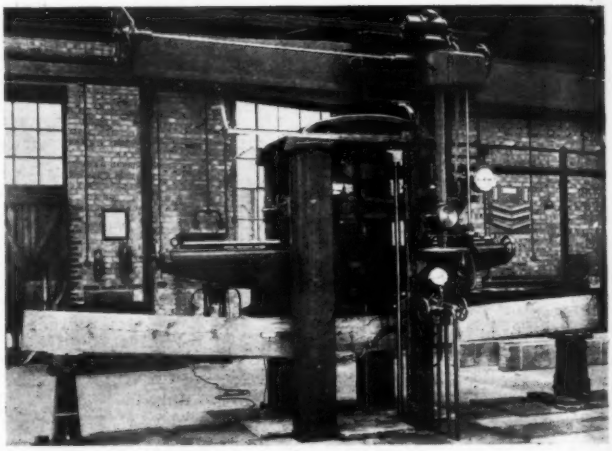
This part of the work is chiefly concerned with behaviour in an established fire. A fire of this type does produce a risk of spread to other buildings, and work at the Station during the war has shown the importance of the radiation from the burning building in causing spread.

The study of these radiation effects is still in progress but results to date have shown the direction in which site planning can be used to reduce the hazard. One of the interesting features of the results is to show that planning for a minimum radiation hazard gives a lay-out very similar to that obtained in planning for optimum natural lighting.

Another aspect of fire research may also be mentioned as being of interest. It is evident that the risk of fire is increased if the contents or structure of a building are easily ignited and continue to burn. Much work has been carried out on this topic in various laboratories; at the Testing Station the investigations have been mainly concentrated on the ease of ignition and rapid spread of flame on wall lining materials, this subject having become more important through the increasing use of board linings as an alternative to plastering. One of the first steps was to devise a test which would enable the different materials to be classified, while some research has also been made into the means of improving materials which were open to criticism on the grounds of allowing rapid spread of flame to occur.

It will be clear that this brief review cannot give a comprehensive picture of fire research, but the examples quoted above have been chosen in an attempt to show the relation the work bears to other building factors.





Tests at the Forest Products Research Laboratory. Top, long term weathering tests on plywood glues. Bottom, a timber joist under loading test.

THE FOREST PRODUCTS RESEARCH LABORATORY. *By F. Y. Henderson, D.Sc., D.I.C., Director of the FPRL.*

In 1920, the Imperial Forestry Conference made a recommendation which led to the establishment by the British Government, under the Department of Scientific and Industrial Research, of a Forest Products Research Board. Its functions were the organization and maintenance of research into the utilization of timber and other forest products. Following a survey of circumstances and the needs of Industry by the Board, the Government, in 1925, set up a Forest Products Research Laboratory. The personnel and equipment were at first accommodated, as a temporary expedient, in buildings at the Royal Aircraft Establishment, South Farnborough, Hants. By July, 1927, a new laboratory had been built at Princes Risborough, to which the staff and equipment were transferred. Subsequently, with the aid of a grant from the Empire Marketing Board, it was possible to add to the accommodation and extend the scope of the Laboratory's work.

The various activities were organized under Sections. The work of the following of them bears on the use of timber as an architectural material.

Wood Structure: to undertake investigations into the anatomical structure of wood in relation to its growth conditions and technical properties; to make identifications of timbers and to maintain a collection of type specimens for research purposes.

Physics: to study the movement of moisture and heat in wood and its elastic properties and machining qualities; to devise new or improved testing methods; and to relate the physical properties of wood to its composition and use.

Seasoning: to study the moisture relations of wood in use; the practice of air-, kiln- and other methods of seasoning and the design and operation of kilns, with a view to greater efficiency and reduction of waste.

Timber Mechanics: to determine from tests the comparative mechanical properties of various timbers, and the influence of defects on strength properties in timber in structural sizes; to study the relation of mechanical properties to other characteristics; and to devise special tests for specific uses. This phase of the work has for its objective the correct selection of species and quality of timber for specific uses and the economic design of structures.

Woodworking: to investigate the underlying principles of wood-cutting and the behaviour of individual commercial timbers during various machining operations; and to study problems arising in the cutting of refractory timbers and composite woods.

Composite Wood: to investigate problems associated with the cutting and drying of veneers and the manufacture of plywood and other composites containing wood as a major constituent, and the properties of adhesives employed in

making composite wood under varying conditions of temperature and humidity, with a view to effecting improvements in technique.

Wood Preservation: to study the durability and resistance to fire of timbers in their natural and treated states, the treatment of timber to increase its resistance to decay and fire, the methods of impregnation with preservatives by species, and the relative toxicity of preservatives and efficacy of fire-retardant chemicals.

Mycology: to study the physiology of staining and wood-destroying fungi; to determine the identity of species causing decay or discoloration in timber; to make special studies of dry rot; and, in co-operation with the Section of Wood Preservation, to study the toxicity of preservatives.

Entomology: to make biological studies of insects attacking timber, with a view to the development of methods of control; to study, in co-operation with the Section of Wood Preservation, the toxicity of insecticides and preservatives.

Chemistry: to study the chemical composition of wood, the properties of its components and the chemical changes induced in wood by various agencies, with a view to improved utilization through a better understanding of its chemical constitution and properties.

Utilization: to undertake industrial investigations into the uses of timbers, irrespective of origin, and of waste wood in the form of slabs and off-cuts, waste material from machining operations, etc. To study the production of charcoal in kilns and effective methods of utilizing sawdust and other forms of waste wood as sources of energy.

External Relations: to act as liaison agent between the Laboratory and industry; to make the necessary arrangement for visits to the Laboratory by students and others seeking general information; to arrange courses of instruction for, and to supervise the work of, advanced students of wood technology; and to organize exhibits or loan collections, as required, for educational purposes.

Publications and Records: to arrange for the publication of the various bulletins, handbooks, records and other literature prepared at the Laboratory; and to maintain a library of works of reference, etc.

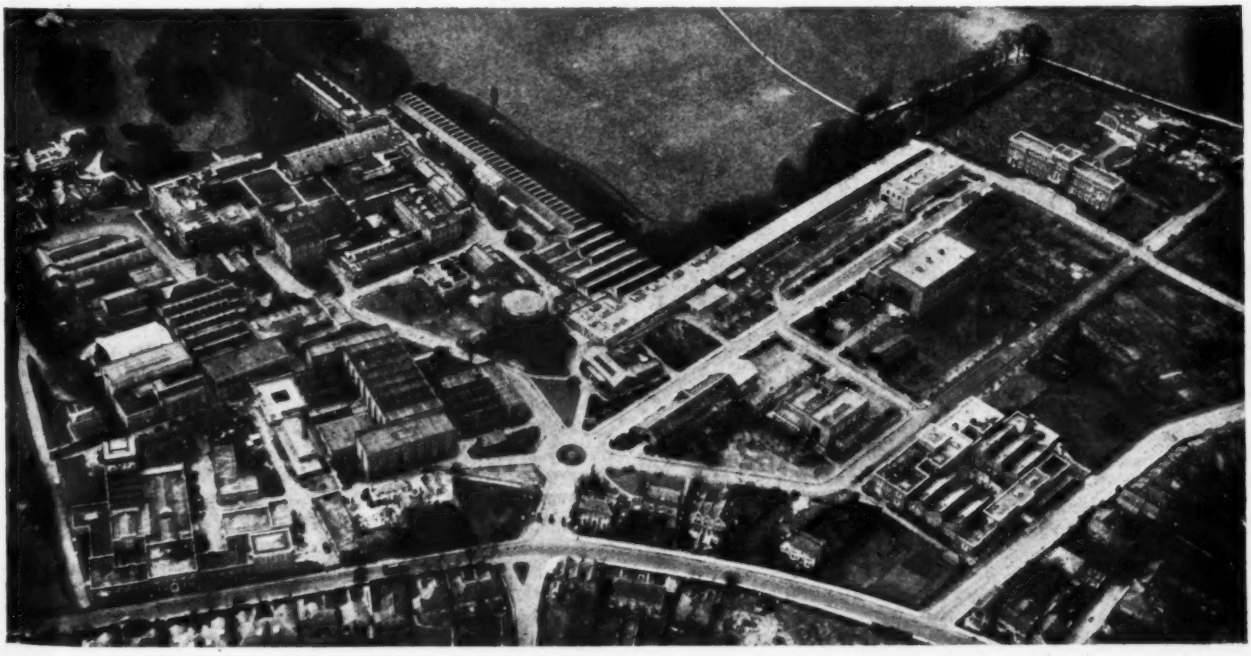
It is necessary to emphasize that the different Sections are not separate units acting independently one of the other, but are rather members of a team co-operating to achieve the general objects for which the Laboratory was established. From their work has resulted the fund of practical knowledge available to industry, and not the least important feature of the Laboratory's work is its free advisory service, by means of which many of thousands of requests for information have been met since it came into existence.

THE NATIONAL PHYSICAL LABORATORY. *By W. F. Higgins, O.B.E., M.Sc., Superintendent of Physics at the National Physical Laboratory.*

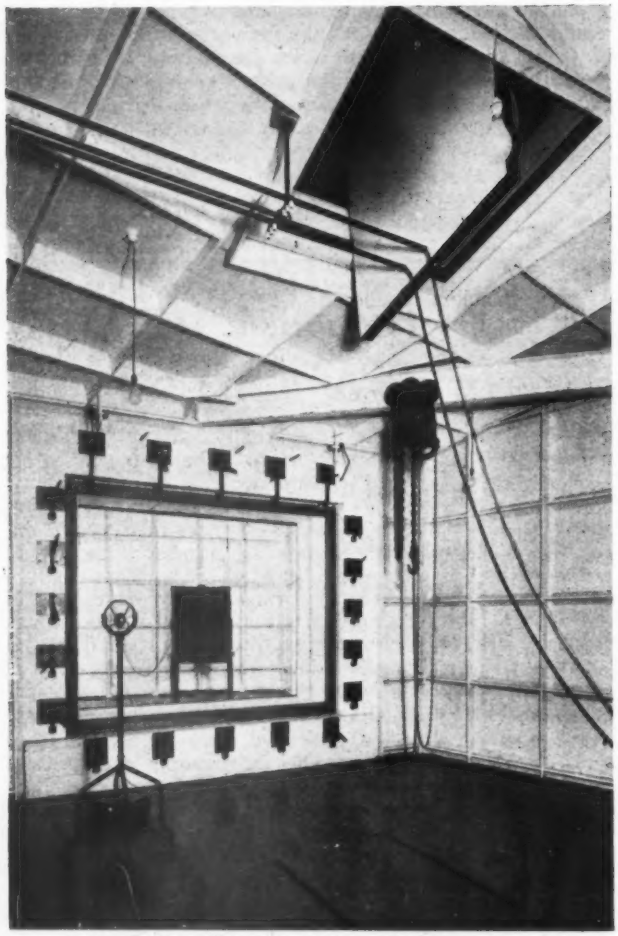
The National Physical Laboratory, Teddington, was founded in 1900 as an institution to carry out research, especially that concerned with the accurate determination of physical constants, to establish and maintain precise standards of measurement and to make tests of instruments and materials. The scope of its activities also includes the investigation of special problems of a physical or engineering nature on behalf of Government Departments and of industry in general. In 1918 the Laboratory became one of the stations of the Department of Scientific and Industrial Research.

At the present time the total staff of the Laboratory is about 1,000, of whom approximately half are trained scientific personnel. The Laboratory occupies some sixteen large and a number of smaller buildings on a site of about 50 acres adjoining Bushy Park. These buildings are specially designed to suit the work and many of them offer unique features of construction and equipment of interest to architects and builders. The work of the Laboratory is spread over ten Divisions devoted to the main branches of physical and engineering science, and among these may be singled out for reference the Physics and Light Divisions in which work is carried out on acoustics, heat transfer and lighting, having direct application to the everyday problems of building design and construction.

In the Acoustics Section of the Physics Division facilities are available for measuring the transmission of sound through walls, partitions and floors, and of measuring the sound absorption of materials which are employed to adjust



Aerial view of the main part of the National Physical Laboratory.



Acoustical Laboratory at the National Physical Laboratory for measuring sound transmission through partitions. A glass panel can be seen under test.

the acoustical characteristics of concert halls, lecture rooms, schools, offices and workshops. Facilities are available for making all kinds of sound measurements, including the intensity and analysis of noise. Many of the measurements can be made away from the Laboratory and for this work a fully equipped mobile Laboratory is available. Much work has been carried out in recent months on the measurement *in situ* of the sound transmission through party walls and floors of prototype houses erected in various parts of the country under post-war housing schemes.

For many years past one of the major aspects of the work of the Heat Section of the Physics Division has been the measurement of the thermal conductivity of all classes of material, including those used in building and in the thermal insulation of domestic equipment such, for example, as refrigerators, cookers, hot water tanks, etc. Other work has included the measurement of the heat flow through composite wall structures used both for outside walls of buildings and for internal partitions. Apparatus is available for making these measurements on wall specimens a yard square —a sample large enough to afford reliable data on most types of structure.

The main work of the Photometry Section of the Light Division is concerned with the maintenance of the standard of light in this country and facilities are available for measuring the intensity and efficiency of all types of light sources. Apart from this, much research has been devoted to the investigation of the measurement of daylight in, and the artificial illumination of, buildings. Researches have been made on the daylight factor in buildings and illumination data have been determined for rooms with a wide range of fenestration.

The results of the Laboratory researches are communicated to appropriate scientific and technical journals or are issued as special reports published by H.M. Stationery Office.

THE MINISTRY OF WORKS. *By Members of the Staff of MOW.*

GENERAL ORGANIZATION

The war and its aftermath has greatly extended the responsibilities and the scope of the activities of the Ministry of Works and has created many new problems. To deal with many of these a Chief Scientific Adviser was appointed to the Minister of Works in 1944 and since then a Division consisting of scientists and technicians has gradually been built up. This Division is responsible in the Ministry for the direction of scientific research and development in building and civil engineering, and application of the results to practical building, and its function is to provide information on scientific matters to all branches of the Ministry of Works and, on request, to other Government Departments having building responsibilities. All problems connected directly or indirectly with building come within the field of survey.

In the space available it is not possible to do more than sketch in brief the general organization and method of functioning of the Division, and, by way of illustration, to add short descriptions of two sections of its work. In this way an indication may be given of the main activities of the Division and of its relation to other research organizations, particularly the Building Research Station, which cover the same general range of problems. It is important to recognize that the activities of these two bodies are complementary to each other.

In formulating general research policy and determining the most fruitful lines of investigation to be pursued the Ministry has the advice of a Scientific Advisory Committee of eminent scientists set up in 1945 under the chairmanship of Professor J. D. Bernal.

The Division is really a service to the executive section of the Ministry, and its work includes studies of the practical difficulties encountered by architects and builders; of new materials and methods of construction and the problems arising from their application in buildings; of the building industry with a view to increasing efficiency by the introduction of improved methods of operation. At the same time close contact is maintained with manufacturers serving the building industry so that development along the most promising lines may be encouraged.

In addition to this work, which is on the normal lines of applied research, a basic study of science in relation to building is also undertaken. This work covers the functional requirements of buildings and the components of which they are constructed so that these may be specified in quantitative terms. This method of investigation envisages that in future an individual material, a building component or a dwelling house will be designed and developed to meet predetermined requirements. Study on the lines described indicates many specific subjects on which research is required, and it is then the function of the Division to initiate such research. The work may in some cases be undertaken by the Division itself, but in most instances the problem will be referred to the appropriate establishment of DSIR, to an industrial research organization, or to one of the universities.

BUILDING MATERIALS

One section of the Chief Scientific Adviser's Division deals with materials, and it is concerned with the collection of information on characteristics, properties and behaviour of materials with particular reference to their use in building

Such information is obtained as far as possible from existing sources (*e.g.*, BRS), or if such do not exist, then it is the duty of the Division to initiate the necessary investigations. Study is also directed to ensuring that the materials are being used in the most advantageous ways, and to develop where necessary modifications in composition, method of manufacture or method of application to ensure greater efficiency. As an example of this type of work, mention may be made of the investigations now in progress to develop a satisfactory process for certain applications of cellular concrete. The general merits of such material are already established, but technical control in the process of manufacture for special purposes is essential if a uniformly satisfactory product is to be obtained. Development work to this end is being carried out under contract by an industrial research firm under the joint direction of the Division and the Building Research Station.

New materials are, of course, being considered with a view to determining the ways in which they may be applied to building, and such work is of vital importance at present. Any assistance which can be given is made freely available, often through the executive sections of the Ministry.

Investigation often reveals problems which require fundamental study. For example, in the use of such traditional materials as cement and plaster there are many problems associated with their behaviour which are by no means fully understood. In conjunction with the Building Research Station and the research departments of the universities, therefore, work has been initiated to study the structure and properties of silicate systems, the mechanism of setting and hardening processes and the factors which control such phenomena as shrinkage and creep when these materials are used for building purposes.

From this systematic study of materials the Division is able to advise other branches of the Ministry of Works on the problems which arise from day to day in respect of the shortage of supplies of normal materials.

In the course of its work the Division is accumulating a large amount of data on materials and their uses, and this information is being co-ordinated so that it will be available for dissemination through the Ministry's regional organization to industry generally.

BUILDING INDUSTRY RESEARCH

As after the previous war, so after this, a large number of proposals for houses have come forward designed in the hope that they will prove better and cheaper and can be speedily erected. These proposals are many, and assessing their relative worths has been, and is, a considerable task. In doing this it has been possible to draw on the intensive work which the Building Research Station carried out in the inter-war years which has been incorporated and enlarged on in the well known Post-War Building Studies. These have provided the standards of performance, given quantitatively, for such essential requirements as strength of components, heat and sound insulation, fire protection, etc., which any alternative method of house construction must meet.

However, this still leaves the problem of the relative value in production of the alternative schemes at the estimating stage. To endeavour to obtain firmer data, early in 1945 a further research programme was introduced which consisted of building a dozen or more runs of about fifty houses each in the more likely of the proposed alternative methods and, while leaving the executive control in the hands of the sponsors, keeping the site under close scientific observation. The prime purposes of these " runs " are to measure as accurately as possible the site labour content, to assess the difficulties or advantages inherent in the production of any scheme, and to endeavour to find the best production methods for that particular scheme. In addition, a costing system, designed to permit detailed analysis has been developed and is being introduced not only on a number of experimental sites, but by permission of the builders involved, on a number of ordinary building sites from which current building costs can be obtained with accuracy so that the relative costs of traditional and alternative building methods can be assessed on the same basis.

To reduce the variables as much as possible it has been necessary to obtain some standardisation of plan and an Advisory Technical Panel of Local Authority Representatives co-operated with the Ministry to produce designs which sought to minimise waste space, occupied a moderate frontage, would prove economical to build and provide the best available living conditions for the minimum outlay by the occupier. While these plans are used in sites under observation, they are also being used as a basis for still further research on the planning of a house.

With the close collaboration of operatives and employers, a very serious effort is being made to obtain accurate cost data. The site labour figures are obtained by observers checking the distribution of labour, plant, etc., on site at regular intervals; where greater detail is required, method study techniques are introduced. Observers also see that all changes are accurately posted to the relevant components and processes. These figures are forwarded together with all other matter reported from the site for consideration and analysis by practical builders collaborating with scientists in close touch with the sites and for analysis by statisticians. The material thus compiled serves not only to provide the answers sought in regard to the particular scheme, but also a background of material from which other research workers can assess the problems facing the building industry. At all stages, those who are studying these sites can put forward suggestions for improvements. If these require some testing in the field before being introduced into an actual building programme, they can be tested at Thatched Barn, the Ministry's Field Test Unit, which, working in close co-operation with a special section dealing with Mechanical Aids to house building and with the Building Research Station, has already produced much valuable information. And, of course, the value of any proposals is put to the estimating section, who, having all this data available, can present an accurate statement from the all-important £ s. d. aspect.

Organized research work in this field is something of a new venture, certainly on such a comprehensive scale. As such it has been necessary to develop a technique for research while the work is going forward. The wide field covered involves a considerable amount of work and the results obtained from the first sites are only now being collated. Much has been learnt and some advances made in regard to the work on parts of a house such as the relation of production methods to foundation design; window detailing in relation to the prefabricated scheme, and the site organization and temporary jigging required for the erection of the frame in another, but it is still too early to deduce general principles from the research as a whole.

HUMAN EFFICIENCY PANEL

This note deals with the work undertaken or envisaged by the Human Efficiency Panel of the Ministry's Scientific Advisory Committee. Represented on the Panel are the Building Trade Employers and Operatives, the Industrial Health Research Board and the psychological department of Cambridge and London Universities. The Medical Research Council has provided the research workers for the main portion of the research; they are serviced and assisted by scientific and technical staff of the Chief Scientific Advisor's Division, Ministry of Works.

While it is obvious that the health and general well-being of Building Trades personnel are very important factors affecting the quality and amount of their work, and also the will to maintain a high level of quality and output on the site, there has not previously been any systematic attempt to investigate these factors from a scientific viewpoint.

The Medical Research Council, through its Industrial Health Research Board, is thus putting at the disposal of the Building Industry its experience of matters of human welfare, which have already been studied extensively under factory conditions; the special conditions in the Building Industry introduce fresh problems which must be solved before knowledge

originating in other fields can be applied, but research work now in hand indicates that, if suitably adapted, lessons learned in factory investigations can be applied to the problems of the Building Industry.

Clearly no definite results can yet be quoted, since the field is a new one for the research workers and time is needed to enable predicted developments to be verified against the event. It is thus possible here to describe only the lines of investigation which are being followed at present.

On the health of building operatives, detailed records of absences due to sickness are to be collected from a number of sites, together with the relevant information as to the composition of the labour force involved, so that a comparison can be made of the incidence of various illnesses with the corresponding data for other industries, and so that methods may be investigated of finding and removing the causes of those which appear to be peculiar to the industry.

Parallel with this, it is hoped to study the different physical requirements of workers in the various trades. For example, a plasterer needs to be stronger than an electrician; but a man with fingers sufficiently dexterous to succeed as a plasterer may not be sufficiently dexterous to succeed as an electrician. This applies even more to mental characteristics than to physical; for example, a dislike of heights would make a man less likely to succeed as a scaffolder than, say, on concreting work. This latter is an obvious instance which a man would clearly appreciate himself, but the question of disliking working at height is more likely to be overlooked when a boy is considering whether he should become apprenticed to the building industry or whether he should follow some other vocation in which the likelihood of working off the ground is much more remote.

In other fields psychologists have made great progress in preparing tests of various types which enable them to predict fairly reliably whether a person has the qualities of mind and body necessary to enable him to be successful in a particular occupation. Such tests do not state categorically what occupation a man or boy should choose; this will depend ultimately on other factors, for instance, his own inclination and the prospects the job offers; they can, however, point out certain lines which he should avoid because it is likely that he may be a misfit and not only waste the efforts of his instructors to train him, but shake his confidence in himself and so spoil his chances of becoming successful in another more suitable occupation.

Research is in progress on producing and trying out tests which may be valid for the building industry: the work has so far been carried out in connection with boys attending Building Trades Schools.

Research into methods of training is also in active progress, based at the Psychological Laboratory of Birkbeck College, University of London. The aim here is to apply to the builder's needs the recent developments in the science of psychology regarding the identification of the key skills involved in learning a job and the best methods of teaching these. This research is also being carried out in close collaboration with Building Trades Schools. Obviously, foreman and chargehand are in a key position in all matters affecting training and the way in which jobs are carried out on the building site. There has been apparent among these men a demand for opportunity for further self training; the research workers are therefore especially interested in the Foremen's Discussion Groups planned for this autumn by the LCC School of Building, Brixton, and are endeavouring to make available, as pamphlets or in any other way which may be appropriate, such as films, the results of research in a form which will be of value to discussion groups of this type.

The other important line of research is a survey, by interview technique, of the attitudes to work and working conditions of the men on building sites. The aim is to gain further information as precisely as possible about the factors which encourage a man to enter and find satisfaction in the building industry. Clearly, it is important to know what is on the worker's mind, to whatever cause it may be due. This survey interests itself both in matters of abnormal present-day difficulties, such as food and accommodation, and in such matters as the part played by family tradition, hours of work and bus or other travelling conditions, previous training and experience, craftsman's pride in good work well done, and so forth.

It is hoped that, together, these researchers will touch on the various major problems affecting building workers as human beings and will make available to the industry much outside experience and knowledge which is waiting to be tapped. The relative effects of the factors being investigated on site and of the general site organization can be related to the data on productivity and cost of building which are being collected independently as described above under General Organization of Research and Development, so that some quantitative measure of their separate and joint effects on production efficiency may be made.

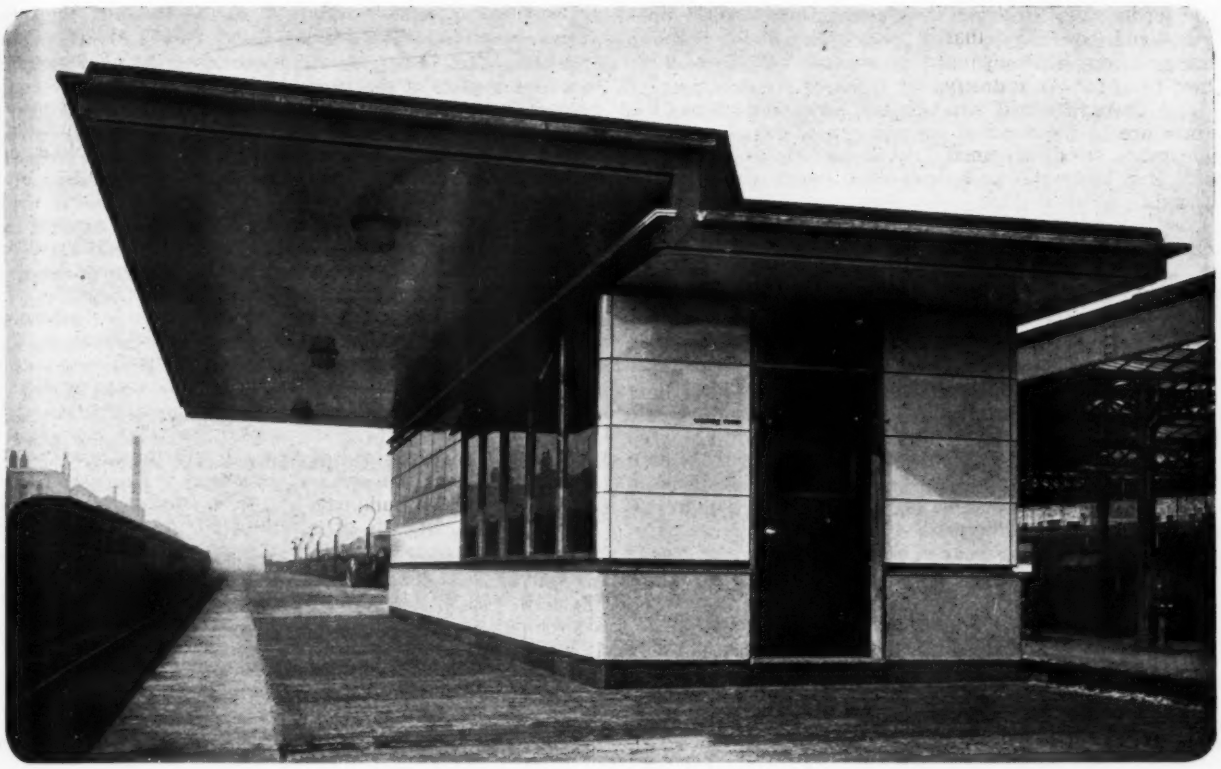
From the nature of this research, its success depends to an unusual degree on discussion and co-operation between the man on the job and the research worker, to ensure that the practical problems studied are the important ones and that they are formulated in the best way for scientific study. Experience so far in this respect augurs well for the future.

3: PRIVATE ORGANIZATIONS

RESEARCH AND PRACTICE. *By Dr. J. L. Martin, A.R.I.B.A., Principal Assistant Architect, LMS Railway.*

One of the main difficulties in connection with building research work is not so much its development, as its application in practice. Between the two wars, we have all been familiar with the separation of practice and research—with research work of a most valuable kind which has never found its way into actual building. Various reasons for this have been advanced. But we are now beginning to see that this defect was not always due, as was so often claimed, to the inadequate spread and presentation of research information. The Building Research Bulletins covered a wide range of practical everyday problems, and, in any case, the information was there, at the BRS, for the asking whenever it was required. Indeed, it is only recently, when research results are being poured out in a constant stream of publications, that we are beginning to discover the real answer to this problem of separation, and that answer is simply that it is necessary to have specially constructed channels through which research can flow into practice.

To do this in the simplest way, two things are required. First, it is essential to have the time and the means to sift and co-ordinate research results into a form in which they can be most easily and conveniently applied to particular problems. Second, it is desirable to apply these results in larger scale and preferably continuous programmes of work.



The experimental unit building at Queen's Park Station designed by the LMS Architect's office.

which in themselves justify the requirement mentioned above, and at the same time give the opportunity for continuous verification of results in actual practice. It is obvious, in addition to this, that where such conditions apply, the contact between research and practice is not just simply a one-way flow. On the contrary, it is a constant interaction in which research is intimately connected with field work, and in which results from actual practice constantly influence the future development of research.

It is clear from this (as it is also from notes in the technical press questioning the ability of practitioners to cope with the mass of research results) that the offices of the small private practitioner and the local builder are not the most suitable channels for the spread of research into practice. The conditions which have been described apply most generally to the larger architects' offices, and particularly to the public offices. The offices of county and local authorities, with their large programmes of school or house building, or the offices of architects engaged on special types of building, such as hospitals or factories, could, in the main, justify the employment of a small section of the office (either continuously or for a limited period) on the study of the research data available and how best to apply it in practice. Most programmes of this type are also important enough to warrant the erection of a small prototype building in which problems could be worked out, tested, and proved, before being employed on a large scale. Apart from the common sense of such a measure, the effect of this on the quality of design and on speed of production might be very marked.

Work of this kind, of course, is not strictly or correctly described by the term *research*. It is more accurately called *development* work, and the operation of this type of work is most easily shown by describing briefly the part played in a particular programme by the development section of one public office—the Architect's Office of the LMS Railway working under the general direction of the company's architect, William H. Hamlyn.

The work of this office covers several distinct categories of building, but the section in which the development work is most complete is that of smaller stations. This study began some years ago with a simple investigation of the problems. It took the form of a systematic examination of stations built during the past twenty years or so. Simple two-column reports were prepared on these buildings; in the first column there was a brief description and in the second column a comment on this. The stations were examined under the following heads:—

1. *Type of station*—its relation to the surrounding locality—its characteristic type of traffic.
2. *Its execution*—how long it took to build—how much it cost.
3. *Its planning*—how many passengers used the station at normal and at peak periods—how many parcels were handled—what was its accommodation.
4. *Its structure*—what technical methods were used—how effective were they in practice—how did they affect planning and speed of erection.
5. *Its services, finishes, equipment and furnishing.*

These studies provided important data both from a planning and a technical angle. From a planning point of view the tabulation of areas of accommodation gave a useful guide to standards—although in addition to this the setting up of standards actually requires to be supported by proper time studies of the use of accommodation taken over a large number of cases. These areas of accommodation could, however, be related to particular numbers of passengers and graphs of passenger and parcels traffic showed the desirability of some flexible form of construction capable of being altered to meet changing conditions. This study of standards and areas of accommodation naturally extends into plan arrangement.

On the technical side, a number of constructional systems had been examined, including monolithic concrete, concrete

frame, concrete block, brickwork, steel frame and timber frame. Finishes had included brickwork, tiling, vitrolite, enamelled iron, wallboard and plywood. All these were studied from the point of view of speed of erection, area of platform cover, thermal conductivity, vibration effects, the performance of finishes and the cost of maintenance. Once these studies were completed, it was possible to state quite clearly the desirable performance of each part of the structure.

It was considered that these performance requirements, since they were known, could be exactly met, if sufficient time was allowed for a large number of preliminary tests and for the erection of a full-scale model, which would also give the opportunity for time studies. The actual experimental building has been described in detail elsewhere* and it is therefore only necessary to make here one or two general comments—the main points are these:

1. If a development section had not existed it would have been impossible for architects engaged in the day to day problems of practice, to devote anything like the time necessary for the specialized and continuous study which this experimental building entailed.

2. In addition to its contacts with the Building Research Station, the LMS development section was fortunate in being able to call upon the services of the Company's own Research Laboratories and other specialists. The development section itself was never constituted to undertake actual tests. It merely summarized the problems, acted as liaison between the various specialists, and related actual results to problems of construction and production. It did in fact maintain the closest touch with all aspects of the problem and ensured that these different aspects were considered in a balanced manner.

3. With the completion of the experimental building it is safe to say that a fair knowledge has been gained of all the problems of construction and erection. The carrying out of time studies by the BRS was an important factor in simplifying erection methods and in estimating cost. The full-scale experiment has also made it possible to make accurate vibration and comfort condition tests and to discover the ease with which maintenance replacements can be carried out. It is consequently possible to undertake a large-scale building programme with some confidence in the actual results. But the work of the development section does not extend into this programme of actual building. Neither, as we have seen, does it attempt to duplicate the work of the BRS. Development work is the intermediary between these two and acting on this plane it ensures that the breach between theory and practice can and will be broken down.

THE WORK OF A LARGE ORGANIZATION. *By C. Mouritz, A.I.Struct.E., Development Department, Imperial Chemical Industries.*

In a large firm of chemical manufacturers such as ICI, Research is taken to mean experimental work in the chemical and physical properties of substances and the laws connecting them, the reaction of chemical substances with each other and with living organisms, the invention of processes, etc. On the other hand, Applied Research—or Development as we prefer to call it when referring to building materials—consists in the application of scientific knowledge and methods to the study of how best to utilize products and render assistance to the building industry in the solution of its problems.

In ICI the products of at least eight Manufacturing Divisions are supplied directly or indirectly to the Building Industry. Those chiefly concerned are the Lime, Paints, Metals, Alkali and Billingham Divisions. In some cases the final material is a combination of the products of two or more Divisions. Each manufacturing Division has a Department, closely linked with its Research and Technical Service Department, responsible for the development of new products resulting from research and the investigation of new uses for standard products. Inter-Divisional development is co-ordinated by a central Development Department which brings together, at regular intervals, representatives of the Divisional Development and Technical Service Departments, when progress is reviewed and problems discussed.

In evolving a new product or a new use for an established material, it has been found that co-operation between the manufacturer, the fabricator or user and the architect or engineer is essential at an early stage if many pitfalls, due to variables in building practice and conditions, are to be avoided. In certain instances this co-operation is established through a firm of consultant architects. For example, the firm of Arcon, which is also employed in a similar capacity by other manufacturers, makes a useful contribution to the organisation as a whole.

Concurrently with the above procedure, the Building Research Station is consulted with regard to the efficiency of the material, its application and the design of the product. At a later stage official tests are carried out at the Station to confirm the work of our own technicians.

The final stage in development of a new material or product is what is known as a period of Restricted Sales Release. That is to say, the material has gone through laboratory tests and preliminary field trials, and is passed to the selling organisation to be introduced to the trade under observation by the appropriate Division's Technical Service personnel. By this method each practical application is observed and performance checked in bulk use. This interim period, which may extend from a few months to many years, is always insisted upon to ensure that every aspect, both technical and commercial, has been covered adequately before general sales release is authorised.

As an example of development, the idea of preparing Perspex in a form suitable for industrial roof lighting was suggested early in 1944. Preliminary experimental work consisted of taking flat sheet Perspex, heating in an oven, and then pressing into a corrugated form using corrugated iron sheets and heavy bars. Corrugations produced in this way were not accurate—it was obviously not a production method, but more suitable techniques were gradually developed.

Laboratory tests were carried out on loading and safe spans, etc., and the sheets tested under actual working conditions at the earliest opportunity. Its excellent lighting qualities and ease of fitting were readily apparent, and it was realised that more scientific and economic distribution of light could be obtained by breaking up the roof lighting on a "chequerboard" system.

The durability and stability of the material were well known from its use in aircraft. After a period of six months therefore it was decided to take some of the larger roofing contractors and structural engineers, together with the Main Line Railway Companies, into our confidence, in order to obtain more extensive field trials.

The results of this wider application being entirely satisfactory, corrugated Perspex was made available for general release four or five months later, in May, 1945.

Meanwhile the BRS had carried out tests on its inflammability. The result was that it was graded with timber in Class III, as being a material of "medium flame spread." The Fire Offices' Committee also recommended to Insurance Companies that no increase in Fire premiums should be necessary, provided the material was used in areas not exceeding 10 per cent. of the total roof area.

The BRS also carried out more exhaustive tests on strength and stiffness, the results of which entirely confirmed our own conclusions. Thus, stage by stage, was evolved a new addition to building of the highest quality and usefulness.

* *An Experimental Station Building*, RIBA Journal, December, pp. 43-49.

4: SOCIOLOGICAL REQUIREMENTS

PHYSIOLOGICAL AND PHYSICAL NEEDS. *By a member of the Staff of the Ministry of Works.*

Up to now little effort has been made, except in the case of one or two isolated problems such as the conditions necessary to thermal comfort or freedom from excessive noise, to apply quantitative scientific knowledge systematically to the study of the physiological, psychological and broad human needs of the user of a building. This has been due in part to the non-availability of the necessary quantitative data, and in part to lack of interest by the architect; both these factors are now changing rapidly.

Architects are now asking for more accurately framed, even if not actually quantitative, statements of requirements. This tendency is being reinforced by the need for economy, to meet which margins of safety must be reduced—and must therefore be put on a quantitative basis. The term Margin of Safety is used not only in the engineering sense but to include factors such as space requirements, lighting requirements and the like which are only now beginning to be treated quantitatively. When building some millions of minimal dwellings we can obviously not afford, for example, to make all the kitchens a square foot bigger than absolutely necessary any more than we can afford to make them a square foot too small.

The gulf which mass building has opened between the architect and his client needs to be closed. This can be completely achieved only when the psychological as well as the physiological reactions of the various senses to the corresponding physical factors of the environment have been put on at least a quasi-quantitative basis. In the meantime, however, our knowledge of statistical methods and their application is enabling a useful start to be made. A healthy distrust of averages is in consequence developing, and one less frequently hears references to such absurdities as the family with two and a half children—a non-existent entity on whose account many houses have in the past been built. It would perhaps be unfair to include in the same category the two and a half bedroom house, as the half bedroom is doubtless intended not for half a child but for a very small child. In more complicated cases, such, for example, as the need of a family for hot water, the dangers of relying on averages are less obvious. The design of a field survey to ascertain how this particular requirement varies with family composition, region, occupation, and so forth, and again with time (to establish daily, weekly or other peaks) is proving a fascinating problem. The presently known rough average figures, though obviously of value in the calculation of overall requirements, are useless when studying, for example, the correct relation between size of boiler (to be decided by mean rate of demand) and size of storage (to cope with peak demand).

In devising methods of studying problems such as these the Ministry of Works has found that in many instances the amount of detail required is too great for the normal survey methods to be applicable. A survey is nevertheless made, to establish whether regional, occupational or other factors are at work, but a detail study of a smaller number of houses is needed to supplement it. Such a study will be started in 1946 or 1947 in fifteen groups of ten houses. In these a series of factors involving plan, equipment, etc., will be varied after the manner of the familiar agricultural strip experiment, and statistical methods employed to sort out the effects of the various variables.

One of the main purposes of this particular experiment will be to ascertain the effect of a number of factors on Space Utilization. There seems little doubt that although low rent houses on the Continent and in North America are smaller than in England, they are not more crowded. This is no doubt due in part to our inefficient heating systems, which result in the whole family crowding round one fire, though this is not the only factor at work.

Before statistical methods can be applied to this problem, it is necessary to define, somewhat arbitrarily, an index to represent the variable we are interested in, in this case space utilization. It has been found that not even this first step can be taken without some preliminary study of how people spend their time indoors, particularly in the evenings when there is the greatest conflict between the needs of parents and children.

The architect (if any there be) who is still inclined to regard the study of decibels and lumens as outside his proper sphere is likely to find things still less to his liking in the future. Great endeavours are being made in fields such as sound insulation and lighting to express requirements in numerical terms and to eliminate reference to Quality. It is well known that it is not an adequate statement of the requirement to say that the sound damping between, say, a pair of semi-detached houses shall not be less than so many decibels. There are some noises which even when relatively faint are peculiarly irritating. But *how many* people find any such given sound peculiarly irritating? Of these, how many are irritated to a degree that interferes with sleep, health or work? Such questions must be asked and answered before a decision can be made as to whether special, and possibly costly, steps to reduce the nuisance would be justified.

Again, in regard to lighting we know that all existing standards of artificial lighting are inadequate in the sense that work at these levels is less safe and causes more eye-strain than work at daylight levels. But how many accidents result? How many children in a school or workers in a factory damage their eyesight, and to what extent? When this is known the problem will become an economic one, and the architect will be able to tell the factory manager or school authority not only what good lighting would cost, but also the cost of failing to instal good lighting.

Here is a great field for collaboration between architect and scientist for the betterment of material conditions, if the architect will momentarily forget aesthetics and the scientist will stoop to study work-a-day problems to which in the nature of things no exact answers can be forthcoming.

THE HUMAN PROBLEMS IN ARCHITECTURE, TOWN PLANNING AND BUILDING. *By Dennis Chapman, B.Sc. (Econs.), Senior Lecturer in Social Science, Director of the Merseyside Survey, Liverpool University, formerly Senior Research Officer, Social Survey, MOI.*

Patrick Geddes, the great pioneer of town planning, was a sociologist, and, although his conception of the town planning survey is still accepted, it is only recently that the social scientist has begun to contribute to the whole range of human problems in architecture, town planning and building. This new situation is the result of the activities of many persons and organizations over recent years. There has been the continuous propaganda for the Ecological Survey of Geddes by the Institute of Sociology. There has been pioneer work in the town planning field by the Bournville Village Trust and the Association for Planning and Regional Reconstruction. In the field of building and dwelling design, development has been fostered by the Building Research Station and the Scientific Advisory Committee of the Ministry of Works.

In the wider field of Regional Planning the Universities of Birmingham and Bristol have made important contributions. The whole movement has had the encouragement of the Architectural Science Board of the RIBA.

Work has been most developed in the field of Sociology. By social survey methods the systematic collection of the essential data for building needs has begun. The most obvious need is for information about family size and composition, overcrowding, and housing conditions. This information is now collected by central and local government bodies. Examples of the use of the social survey in this field can be found in Post-War Building Studies No. 12, *The Lighting of Buildings,* and in Post-War Building Studies No. 19, *Heating and Ventilation of Buildings.* In these reports the conditions of lighting, heating, cooking, and water heating are described for samples of the population, and the influence of costs and income is studied.

In the main these surveys give information about how people live in unsatisfactory conditions so that the data is not the best kind for planning ahead. New types of researches have been sponsored by the Scientific Advisory Committee of the Ministry of Works to study family living as a basis for dwelling design, first in existing houses, then in houses of experimental design and equipment. The first studies are to ascertain the range of human activities within the home, the space and equipment required, the conflicts of activities, the reasons for conflicts, the influence of such objective factors as heating and room size and subjective factors as habit and taboo. A pilot inquiry into the problem of children's study at home is being made at Liverpool University.

The second stage of these studies is the Ministry of Works 15 by 10 experiment in which the living habits of families in experimental houses will be studied by the direct observation of tenant observers. The families will be studied at three stages:

1. The moving in and settling down stage—initial adjustment.
2. After a period of, say, a year—final unaided adjustment; and
3. After a period during which advice and guidance has been given.

Stages 2 and 3 are designed to discover the part that must be played by education in rehousing.

In the planning field sociology has many contributions to make. Unfortunately, so far, its methods have been used, in many cases, to collect irrelevant trivia or to contribute to futile disputes about houses or flats.

Progress, however, has been made; more information is now available from the Social Survey's study of Middlesbrough about the effects of social mixing in housing estates—evidence which conflicts with the Dudley Report prescription for neighbouring units. The same research showed the very considerable social integration between neighbours, and suggests that in rehousing more attention should be given to this fact.

The studies of Brennan in Wolverhampton have shown that the general pattern of human flow in a city must be considered if urban sub-centres are to function effectively.

In studies made in Scotland and in Middlesbrough, the Social Survey has shown that convenience to a school or a work place can be expressed in time or distance for a given proportion of a population.

The greater contribution will, however, be made when sociology is able to give a coherent picture of social trends to guide the planner.

Although Gilbreth, the pioneer of time and motion study, did some of his first work on bricklaying, the application of psychological methods to the building industry has long been delayed. Now, under the stimulus of the Ministry of Works Scientific Advisory Committee and the Industrial Health Research Board, new research is being undertaken.

The fields of selection, training and working methods are being studied, and proposals to study the efficiency of the working group and qualities of leadership in foremen are being considered. Parallel to this, studies are being made of the housewife's work and equipment, using methods of industrial psychology. Later it is proposed to apply the same methods to circulation within the home.

Psychiatry has not yet made its contribution, but it has an obvious field in the problems of resettlement in new housing estates and in working out techniques for social reintegration.

In the future, psychiatry will work with architecture in problems of civic design to create a symbolism which will express and create civic consciousness, unity and pride.

At this stage in housing and planning tremendous opportunities present themselves for teamwork between the social scientist, the building scientist, the architect and the town planner. It is essential that every new development should be adequately studied—Sir Charles Reilly's village green communities at Bilston, the first neighbourhood units, the new satellite towns and, as a matter of urgency, the garden cities of Letchworth and Welwyn. The programme of planned development over many years presents a quasi-experimental situation which is not likely to arise again in the lifetime of the present generation of social scientists, and it is an opportunity for them to make a great contribution to human welfare.

5: DISSEMINATION OF KNOWLEDGE

DISSEMINATION OF THE RESULTS OF BUILDING RESEARCH. *By A. L. Gardner, B.A., Librarian at the Building Research Station.*

There are various classes of potential users of the results of building research. Among these, the scientific and research workers are generally equipped with special machinery for gathering the information which they require in their work. Architects and builders, on the other hand, are not usually equipped with an information service, and any information intended for them must be brought to their notice through some channel such as the technical press. Methods other than publication, such as direct answers to inquiries, special courses either at an educational centre or at the BRS, lectures, exhibitions, etc., are useful supplementary methods, but space prohibits a discussion of all of them in this note. Thus, in this outline of the methods by which the building research carried out by the Department of Scientific and Industrial Research is made available to the architect and builder, special attention is given to the published word.

First, there are the three series of BRS reports published by H.M. Stationery Office and consisting of Special Reports, Technical Papers, and Bulletins. The Bulletin series is specifically prepared for users such as architects and builders; the Special Reports give fuller treatments of their subjects, and will be of interest to architects; the Technical Papers are, as their designation implies, technical accounts of items of

experimental work carried out in the BRS laboratories.

Before the war, the most comprehensive accounts of the activities of the BRS were to be found in the Annual Reports of the Building Research Board, published by H.M. Stationery Office. The issue of a BRS annual report, probably in a modified and abbreviated form, is shortly to be resumed after the hiatus caused by the war.

A warning should be added that practically all of the above series of reports are at present out of print as a result of enemy action, but copies are available at the national, professional, and many provincial libraries.

The monthly abstracts journal, *Building Science Abstracts*, which the BRS publishes through H.M. Stationery Office, is important in that it provides a key to a very great deal of current literature on building. It is compiled at the Station primarily as a research worker's tool—a point which should be borne in mind when discussing the possibility of making BSA more useful to architects and builders. Builders are not normally users of abstracts, and it is open to doubt whether more than a small minority of architects could become regular users of an architectural abstracts journal, were such a journal prepared specifically for them. However, some attempt has recently been made to include in BSA a larger proportion of material likely to be of direct use to those readers who are not purely scientific and technical workers.

The publication in architectural and building journals of papers on the research work is, as mentioned above, probably the most effective way of reaching architects and builders. Even so, some papers of potential value to architects are published in other sections of the technical press, *e.g.*, in engineering journals, and may therefore be missed. If any reader wishes to follow up the work of the Station as published in the technical press, there is a limited stock of a classified list of some 200 papers by officers of the Station available on application to the Director of Building Research.

A very wide circulation of notes on problems of a practical nature was achieved by the *Notes from the Information Bureau of the Building Research Station*, most of which were published in a number of architectural and building journals. The issue of further notes in this series was suspended during the war and has not yet been resumed.

More recently, the BRS has issued a series of notes on the *Repair of Damaged Buildings*. The twenty or so notes which have appeared in this series to date have been sent free of charge to a large number of inquirers, and copies can still be obtained by application to the Director of Building Research. Besides recommendations on the repair of war damage, the notes also deal with problems arising from lack of maintenance during the war.

An important and practical way in which one part of the Station's work reaches architects and builders is through the publication of Codes of Practice and Standard Specifications. The BRS has for many years been represented on a large number of the committees of the British Standards Institution which formulate Standard Specifications for building materials and components; and more recently the Station has been actively participating in the work of the Codes of Practice Committee through which the industry, professional institutions and Government Departments are drawing up this country's first comprehensive series of codes of good practice for building.

Before leaving the subject of publications, mention should be made of the *Post-War Building Studies* series, some of which incorporate a great deal of the work done at the BRS and of the experience gained during that work.

Besides putting out information in published form, the Station also deals with inquiries from firms and individuals. This method of individual question and answer has its practical limitations, of course, but is valuable for dealing with unusual problems which call for the specialised knowledge of the research staff. Just before the war the number of inquiries dealt with by the information service at the Station had risen to about 3,000 a year. An interesting point is that nearly one-third of these inquiries were from architects—a proportion greatly in excess of the ratio of practising architects to other classes of inquirer. Readers may like to speculate whether this shows that architects are better users of information services, or whether it is due to the frequency with which an architect is called in only when things have gone wrong.

THE RELATION OF SCIENCE TO ARCHITECTURAL TEACHING. *By Cecil C. Handisyde, A.R.I.B.A., A.A.Dip., Lecturer at the Architectural Association School of Architecture.*

To anyone connected with teaching in Architectural Schools it must be evident that a marked change in the demands of students has occurred during the last ten years or so. There is a steadily increasing wish for more "science." It is also evident that a number of architects, including quite a lot of teachers are somewhat apprehensive about this change. They fear that architectural teaching may become a matter of formulæ and tables and that the finer points of design will be lost. Is there any ground for such fears and what is the true function of science in the teaching source?

Architects are doing the scientists an injustice. Scientists do not regard their contribution as an alternative to the trained skill of the artist. They realise perfectly well that the facts they give are only to be used as a means to an end. On the other hand, they do believe that the only way to obtain the best architecture is for architects to have a full appreciation of the contribution which can be made by science.

The gradual changes which have occurred over a period of centuries have been very largely governed by scientific achievements which have given the artist new opportunities in design. The present position seems to be that with the mass of new materials and methods of construction and the increasing number of special factors such as acoustics, sound insulation, lighting, heating, etc., it is extremely difficult for the architect to make sure that he is incorporating all the best features in his design. To some extent this can be remedied by the use of specialist consultants, but if the sketch designs are not conceived with these essential factors in mind then there is bound to be trouble at a later date when the consultants are called in. On the other hand if the designer has a reasonable appreciation of the more important aspects of all these subjects he should be able to take them into account and balance the relative importance of each at the earliest stage of design. In doing so he will find that he has in fact found a real basis for a contemporary architecture.

How does this affect the Schools? Clearly somehow the teaching course must endeavour to provide the students with the information essential to dealing with these factors in their subsequent practice.

The normal method of teaching seems, in many cases, to rely mainly upon a gradual progression in the presentation of facts. With the increasing complication of building this has meant an increasing number of lectures until now the Schools find difficulty in accommodating all the requirements into a timetable.

One of the functions of scientific study is to arrive at basic principles. If these principles can be clearly expounded in the form of lectures it should be possible to achieve two important objectives. First, students will be given a sound foundation upon which they can work out a variety of answers to suit their individual problems. Second, these lectures should be able to show clearly and directly the influence of the technical aspects of building upon design. A third incidental advantage would be that the better the lecture course and the more it succeeded in reducing a subject to a clear statement of principle, the shorter it could be. In such a course it is suggested that the practical application of the principles would be achieved in studio subjects.

There are two immediate objections to this method. First the lack of sufficient number of lecturers of the required type (a very high standard is required since it is much more difficult to give a simple lecture on principles than a lecture consisting of a series of facts). Second: the need for an appreciation of the co-partnership of science and art by the studio staff together with sufficient knowledge by them to enable them to assist the student in the application of principles. Neither of these deficiencies can be remedied overnight, but if the profession would recognise the true value of science in providing the designer with the information he needs for designing, it would not be impossible to arrange for the proper training of an adequate body of teachers.

It may fairly be said that with the increasing proportion of School-trained architects, the future of architecture is largely in the hands of a very small band of teachers. To some degree the shortage of the right kind of instructors is probably due to the fact that architectural schools do not encourage post-graduate studies. If this could be changed there would probably arise a small but steady flow of the right kind of architectural teachers. Once this was assured there would be a distinctly bright outlook for the future.

6: THE USER'S POINT OF VIEW

THE ARCHITECT. *By M. Hartland Thomas, M.A., F.R.I.B.A., Vice-Chairman of the Architectural Science Board, Hon. Sec. Mars Group.*

Architectural Science and Architectural Research are phrases that still strike a somewhat discordant note on some ears. They really amount to much the same as expressions like Study or Scholarship for our predecessors: but with this difference, that there is now expressed a conscious effort to make architecture an important link between Science and the Arts. Even this is not particularly new, since Albert the Prince Consort used to be a most zealous advocate of such a *rapprochement*: it will be a fine thing if 1951 sees the hopes of a hundred years realised in a closer harmony between these two manifestations of the human spirit.

Before the results of Scientific Research and the clarity of the Scientific Attitude can have their full play in architectural work, much more is required of the scientists than they yet know how to contribute. We architects are trying very hard to assimilate scientific results and method into our work. The scientists may be endeavouring to make contact from the other side: if they are they have not yet come in sight.

A very large amount of the practising architect's time is today expended in keeping track of scientific developments in fields with a bearing upon his work: sociological and statistical studies related to planning, medical theories affecting comfort conditions in heating, lighting, ventilation, etc., the more restricted department of building science for the properties of materials, advancements in structural engineering (he has to search abroad for most of these), the economics of production and costing, mechanical equipment (*e.g.*, the heat pump), and many more.

In all this there is severe compartmentalisation and a crying need for co-ordination and central direction. Research and study proceed at many academies and in the laboratories of private companies, each content to overwork one small patch of the field, and many jealously guarding their secrets, in spite of the advantage to themselves and to the world that would accrue from a freer interchange and co-ordination.

This would cover two things at the same time. In interpreting the work of the various specialists to each other, and to potential users—in this case the architects—it would reveal the gaps in the present coverage and prompt initiation of the studies required to fill them. For there are some large gaps. To name one: they give us no physiological basis for ventilation: there is a welter of "science" in apparatus for different aspects of performance, but no one will tell us what it is all for, why we must have it at all, although common experience tells us that we must have some ventilation.

It is not enough to let Building Research take its own course, unco-ordinated. Then its development is more the result of economic factors, than directed towards the satisfaction of human needs. Recent German experience is a case in point. The German building industry was dominated by a very few enormous firms for building and civil engineering combined. These big firms called the tune. Research in structural engineering produced brilliant results, but questions closer to people and their homes were neglected.

THE BUILDER. *By C. Douglas Calverley, Past-President of the National Federation of Registered House-Builders, Vice-Chairman of the Scientific Research Committee of the National Federation of Building Trades Employers.*

The function of the contractor requires him to be a combination of master craftsman and economist. He must be sufficiently creative to give reality and solid form to the dream and the drawings of the artist. A sound knowledge of the principles of building construction, a background of drawing and measurement and experience in directing the activities of workmen in many crafts and the use of machinery are the qualities which fit him to fulfil his function. Many architects of repute gratefully acknowledge the practical help which they continuously receive from the experienced contractor.

A builder may operate either in the capacity of a contractor or that of an *entrepreneur*. In the former capacity he is somewhat restricted inasmuch as he is required to carry out the instructions of the architect as set forth in a specification that, under modern practice, tends to become over-rigid. When contracts are awarded as the result of successful competitive tender it follows that the basis of the tender, *i.e.*, the specification, must be definite. Straining after definiteness combined with economy and speed *at the specification stage* is a deterrent to initiative and experiment with new materials and methods, as any authorised departure from the specification at a later date would involve a variation and defeat the object of competitive tendering. The initial rigidity of the specification has the effect of slowing down progress with the development and use of the results of scientific research.

As an *entrepreneur*, *i.e.*, a speculative provider of buildings, whether these be large blocks of offices or flats or small dwelling houses, the builder is generally in a much better position to utilise to the full the results of all the research and successful laboratory experiment that are available to him. Instead of a rigid specification he adopts a structural

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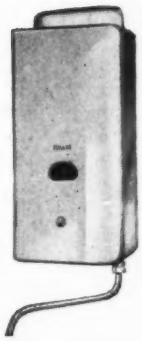

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standard and does not hesitate to reach that standard by alternative methods, particularly if these methods are cheaper or more expeditious or otherwise offer tangible advantages.

There is a widely held belief that the early work of the Building Research Station was somewhat stultified; to guard against the risk of giving undue publicity to some proprietary materials, reports, it was said, gave the impression of being inconclusive. Whether or not this criticism is justified, it is true that many builders found the language of the Building Research Station Reports difficult to understand. Some recent Reports have shown considerable improvement in this respect.

More and more builders are becoming research minded. It would perhaps be of assistance to them if there were published a classified bibliography with well indexed cross-references to assist organised study of particular problems and quick assimulation of results.

THE OPERATIVE. *By R. Coppock, General Secretary of the National Federation of Building Trades Operatives.*

The subject of research in the building industry is a recent development when compared with the age-long practice of building, but it is nevertheless one which closely affects the operatives. Research necessarily assumes a place of particular importance now, when close attention must be paid to the speediest methods of housing. But operatives must not only concern themselves in research; they should themselves take an active part in technical development. As a matter of fact, the operatives are represented on the Scientific Advisory Panel of the Ministry of Works, and will thus be in a position to assess the value of any new suggestion in building technique.

From the users' point of view, that is, the point of view of those who have to handle new materials and make use of any new technique or development, it is important that research should be conducted on lines which ensure willing co-operation. It would be futile to disregard the life-long habits of the users, and by the introduction of untested or insufficiently tested methods evoke hostility or aloofness.

In the past there has been trouble with men on the job when a new material or a new way of dealing with old materials has been introduced without any kind of prior consultation. The trouble has only arisen when the operative feared—perhaps not always with justification—an encroachment on his economic standards. The fear of unemployment was ever present, hence the suspicion on the part of some men that a departure from traditional ways might adversely affect them. That is why I think it essential that new techniques and developments should, where possible, be accompanied by explanation.

In these days, when there is less danger of prolonged unemployment, there is naturally less danger of suspicion of anything new, but I think it just as necessary that the co-operation of all concerned should be enlisted. If, for instance, prefabrication is proved to be an asset to the speedy erection of houses—although in this connection I think much remains to be proved—then there should be adequate explanation of tested experiment. Science and research must not be something apart or outside the daily experience of the ordinary citizen, but must become attached to his work-aday life. He is, after all, concerned in all the manifestations of scientific experiment and result; and while not, generally speaking, in a position to take an active part in experiment, must remain the final judge of the results. The operative, then, as user, must have his interest enlisted, and so be encouraged to form an impartial judgment of the value of any new method or technique brought into his daily life.

THE TECHNICIAN. *By K. J. Campbell, A.R.I.B.A., Association of Building Technicians.*

It is probably true to say that the normal technical assistant's reaction to Building Research as it is to-day is negligible. This may be an over drastic judgment, but it is certainly true that the Research Stations are remote and appear to have little to do with his everyday work. He seldom sees any result of their activities, and when he does it appears in brief leaflets or articles made confusing by scientific nomenclature which cannot normally be connected with the materials with which he is familiar under proprietary names. He tends to turn for information to the manufacturers or the catalogue rather than to a source of objective knowledge.

He is conscious that the development of new methods and thence of a new æsthetic depends on a scientifically informed use of materials, but in practice he is driven to make his decisions in the light of painful experience of the art of distinguishing between genuine value and salesmanship. Far too often his scientific reference book is the manufacturer's advertisement or catalogue. It is not surprising that he tends to "look up what he did at—— and do it again."

The work of the BRS, and the rest, excellent though it may be, is far too restricted in scope and magnitude for the needs of the man on the drawing board. Where it is available it appears isolated, disjointed and "bitty." The present system under which the bulk of research is carried on by the manufacturers working in their own narrow field distorts the development of new materials, tends to hide or camouflage inherent defects and, in fact, is now holding up the development of Scientific Building. In too many cases a new idea is twisted to suit the remainder of a firm's product or its existing production machinery. The evil effects of monopolization of new materials by one concern are well known to all technicians.

The present farcically minute provision for research in this country needs to be increased many times. The greatest emphasis must be placed on large scale experimental development of new methods on the lines of the experimental housing groups now being carried out by MOW.

If necessary publicly owned factories should be set up to produce where private firms cannot or will not. Only if this is done can the technician confidently strike out on new lines to solve the pressing problems that confront him.

Research and the results of research must be brought right to the drawing board.

All technicians wherever they work should be drawn into a nation-wide programme of development, in the formulation of which all should have a part. The widest form of consultative Council needs to be created linked with a greatly increased Research organization with ample resources.

In this way some coherence and positive direction could be given to the whole problem. *Research is not simply the business of a handful of technicians specially trained in building science. It should be the concern of all from the junior assistant upwards, Architect, Engineer and Craftsman alike.*

It will not be until this is attained that a new art of Building will emerge equal to the needs of our day and able to compare with the great periods of the past.

THE STUDENT. *By Ruth Pocock, Student at the Bartlett School.*

A student came into the library at the RIBA and had a book recommended to him on Drainage and Sanitation. He refused the book because it was too comprehensive. He made this distinction: I don't want to know about drainage

and sanitation, I want to know the answers to the examination questions. It was not cynicism, nor is it quoted here for that reason; it is quoted as an example of the attitude that is accepted as commonplace among students now, but which was probably rare in students qualifying before the war. In those days, five years architectural training was considered as an adequate base for practice: it was assumed that, given a little experience in the business side of office routine, a qualified student could set up in practice as soon as he could find a client. Students now realize that their training is more of a background of theory, sufficiently fundamental to carry the mass of detailed knowledge which they will acquire on leaving the school and which is the technical qualification of the builder.

Whether or not this is a desirable state of affairs is not at the moment relevant: it seems an inevitable stage in the dissemination of a subject which is growing very quickly.

This attitude among students, of accepting the unreality of their training, explains their reaction to science in architecture. If they have been taught that architecture is an art, they shun science as a future adornment but a present encumbrance. If they have had any encouragement towards science they seem to consider building science as synonymous with design: students are at an uncertain age and tend to clutch at anything that looks definite, and they get bogged down in the welter of technical publications so that they cannot think clearly and forget how to design. Yet science is accepted as a normal component of everyday life. Cannot this be extended to architecture? There seem to be three things which we as students need from science.

First, direction in the information which is already accessible to us. There is a great deal of it, and part of it is important to us during the training period, but we don't know which part.

Second, we want more science in architecture, more knowledge of why we are doing what we are doing. This relates to history and the general theory of design as well as to methods of construction.

Third, we want more time. Looking at buildings and sketching is the most valuable part of a training in design, but every term the syllabus becomes more crowded. Is it not possible that a little scientific thinking on most of the established subjects would increase the content and reduce the verbiage?

If these things were achieved, architectural training, despite its length, could be a continued stimulus and produce architects who, neither technically ignorant nor æsthetically dulled, would build with confidence and imagination.

7: CONCLUSIONS

SCIENCE AND THE ARCHITECT. *By Professor J. D. Bernal, F.R.S.*

By devoting one of its numbers to a general survey of science in building, the ARCHITECTS' JOURNAL has made a notable contribution to the better understanding between the architects and the scientists. The number of its papers and the wide range of subjects covered shows that the contacts between architecture and science have been recently—and particularly since the war—enormously increased and deepened. But it should also be clear from the fact that many of the papers refer far more to work projected or work in hand than to results achieved, that the real practically valuable contact between architecture and science is only just beginning. We are now in an intensely formative period, and consequently in a period when what matters most is that we should set off in the right direction and that we should all set off together.

The architect and the scientist have complementary and not competitive functions, and this symposium will have achieved its purpose if it brings out this point alone. The older conception of the relation of science to architecture, as of the relation of science to any of the arts or techniques, was based on the idea of the intrusion into the art of a new and strange element derived ultimately from the fundamental study of nature. Such intrusions, of course, have occurred and are occurring, and they have revolutionized our technical capacity—the internal combustion engine and electricity are cases in point. This type of contribution, however, has now been largely overshadowed by the more intimate contribution which the methods rather than the results of science can make to any human activity, an operation which though it introduced no abrupt changes rapidly increased the tempo of technical advance. The older type of technical advance was based on a step by step, cautious trying out of modifications of existing practice which might take hundreds of years to develop a new logical architectural form such as the late Gothic church. The new scientific methods tries, in the first place, to seize the essential problems, to proceed to their formal solution, and then to embody that solution in new techniques.

Now architecture is much more than technique: it involves the construction of buildings which have to satisfy the physical and cultural needs of individuals, of families and of society as a whole and, therefore, the elements of social need and æsthetic satisfactions must run through it in all its phases. Here again science can step in to hasten the definition of the problem, to prescribe the actual measurable requirements that the building must satisfy if it is to fulfil its social function. This is the work which the Building Requirements section of the Ministry of Works Scientific Advisory Committee is attempting to do by means of its surveys and experimental houses schemes. In these schemes full regard is being paid to the fact that people are much more than animals to be provided with ideal physical conditions—heat, light, cleanliness, etc.—they are social beings who must find in their homes the maximum of enjoyment and the minimum of drudgery. From such studies comes the specification of houses: specifications translated into modern functional engineering terms of performance, either in strength, heat or noise resistance, and, once these have been determined, there is something for the designer to get busy on—to attempt to clothe these abstractions in the actual walls and roof of a house.

Here, straight away, is where the architect and the scientist meet. There is no such thing as a scientific house. There are an infinite number of designs, all of which will give substantially the same physical—and even the same social—performance, and it is the architect's function to find that group of different solutions which provide at the same time an optimal standard of satisfaction for the occupants and a pleasing variety in appearance. Now the best way to do this is not for the scientists to lay down specifications and the architects to design to them. It is much more to get the scientist and the architect to sit in the same office, visit the site together, and create together step by step the resulting building. But they cannot do this alone. Buildings not only have to be built, they have to be paid for; paid for in human labour and time and, therefore, here again, the scientific method, with its statistical analysis of costs and its study of the performance of men and machines, must be invoked. This field, which is being studied by the Building

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A.J. 28.11.46

Industries section of the Ministry of Works Scientific Advisory Committee, is a relatively new one for science, and many of the older scientists have tended to look down on the limitations that economic considerations impose on their ideas and constructions. Actually, however, it is even intrinsically a very salutary restriction, for it is just as important to remember that building houses as well as living in them is a social activity, and the total solution must involve both. It is not much use producing a beautiful prototype only to be told that it costs far too much or producing a low-priced house only to be told that much better could be done for the money. Again, this means that the statistician or economist must form a third with the architect and the scientist in the designing of really practical building types. Such co-operation is needed, and has existed in the arts themselves for millenia, as, for instance, between the composer, the librettist and the choreographer.

Plans and prototypes are in themselves, however, only the beginning. The real job is to get the house built, and here the architect and the scientist alike hand over to the contractor, the builder and the building trade workers. It is a tragedy of the last hundred years that the knowledge and skill of the architect was so perverted in passing through builders' hands that we have had to suffer the hideous appearance of our modern cities. The same must not be allowed to happen in the scientific architecture of the future. It is essential to involve all those engaged in building in the new venture, to make them see how the new aims and the new ways of doing things will make their task both lighter and more rewarding. This is an enormous education task, but no greater than that which was so successfully solved in the Forces during the war. To carry it out, however, requires the fullest and closest co-operation between the scientist and the architect. In this the Architectural Science Board of the RIBA, which may reasonably claim to be the pilot organization for the comprehensive integration of science with building, may play a notable part. By its very existence it shows that the scientist and the architect are not rivals but colleagues, who have been too long parted and must come together effectively in the common task of building cities which will be worth living in.

Announcements

Mr. Francis J. Meeson, A.R.I.B.A., is now in practice at 131, Lichfield Street, Walsall. Telephone: Walsall 5796.

Mr. P. B. Nash, A.R.I.B.A., 10, Cedar Mount, Huddersfield, wishes to receive the Manufacturers' Catalogue Distribution List.

The Architects' Department of the Bournville Village Trust, Estate Office, Bournville, Birmingham, 30, would be glad to receive catalogues from manufacturers and others.

THE PROBLEM OF LIGHT

IN many types of public buildings, daylight and artificial light are not the only problems. There is a third essential — Emergency Lighting. It should be planned, as the other lighting is planned, by the architect.

When emergency lighting installations must be considered, make full use of Chloride. Their experience of the subject goes back to earliest pioneer days. Their knowledge is always freely at your service. And they are the makers of Keepalite, the automatic system which uses the mains interruption itself to switch on the emergency lighting.

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319

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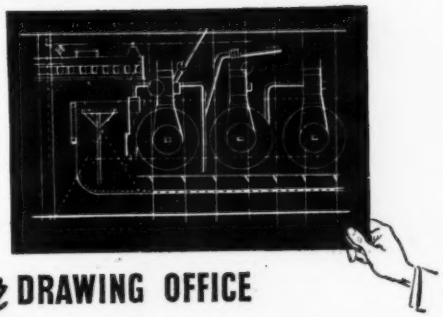

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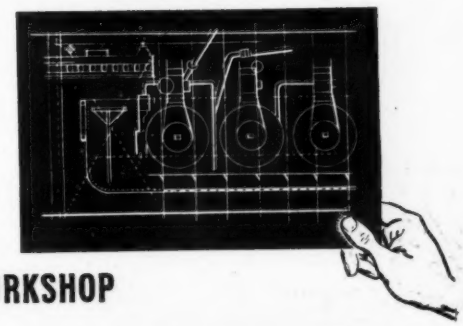
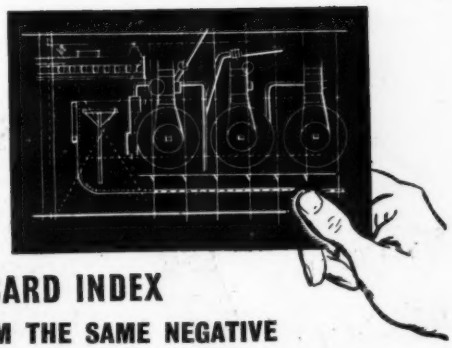


WORKSHOP



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CLASSIFIED ADVERTISEMENTS

Advertisements should be addressed to the Advt. Manager, "The Architects' Journal." War Address: 45 The Avenue, Cheam, Surrey, and should reach there by first post on Friday morning for inclusion in the following Thursday's paper.

Replies to Box Numbers should be addressed care of "The Architects' Journal," War Address: 45 The Avenue, Cheam, Surrey.

Public and Official Announcements

Six lines or under, 10s.; each additional line, 1s. 6d.

THE INCORPORATED ASSOCIATION OF ARCHITECTS AND SURVEYORS maintains a register of qualified architects and surveyors (including assistants) requiring posts, and invites applications from public authorities and private practitioners having staff vacancies. ADDRESS: 75, EATON PLACE, LONDON, S.W.1. TEL. SLOANE 5615. 991

LONDON COUNTY COUNCIL.

Applications are invited for the following positions:—

(1) QUANTITY SURVEYORS AND ASSISTANTS (SENIOR AND JUNIOR). Required for:

(*a*) "Taking-off" quantities, measuring, and adjusting variations under building contracts and preparing estimates.

(*b*) Preparing estimates and measuring repairs and minor works under schedule of prices (experience of London County Council, War Department or Office of Works Schedules).

(*c*) Working up, etc., in connection with domestic buildings and general working up (junior).

(*d*) Measurement of roads and sewers and housing work on cottage estates, preparation of interim and final bills on Schedules.

(2) ARCHITECTS, BUILDING SURVEYORS, TECHNICAL ASSISTANTS (ARCHITECTURAL), AND JUNIOR DRAWING OFFICE ASSISTANTS. Required for:

(*a*) Work in connection with the design and development of housing schemes for cottage estates and block dwellings (experience in domestic architecture preferred).

(*b*) Similar work in connection with schools and hospitals.

(*c*) The preparation of estimates and specifications for works of cleaning and painting, repairs and minor alterations at schools and hospitals.

(*d*) Assistants to district surveyors. A knowledge of the London Building Acts and by-laws is necessary for these positions.

(*e*) Junior drawing office assistants for general drawing office work. Should be able to finish plans from rough drawings, take dimensions and make sketches. Pay, according to age and experience, up to 65s. a week, plus cost-of-living addition.

(3) HEATING ENGINEERS AND HEATING AND VENTILATING ASSISTANTS. Good technical education required. Applicants must be experienced in the design of, and preparation of drawings, specifications and estimates for modern hot water heating, ventilating and hot water supply schemes.

Except as otherwise shown, salaries for the above positions will be determined by qualifications and experience up to a maximum of £420 a year, together with cost-of-living additions up to £90 a year, according to basic salary. Salary up to £500 for certain positions of heating engineer and building surveyor. Successful candidates will be engaged on a temporary basis, but will be eligible for appointment, according to merits, for permanent appointment on the occurrence of vacancies. Temporary staff are required to contribute to the Council's Superannuation and Provident Fund.

Ex-Service candidates with experience prior to their war service will be specially considered.

Application forms may be obtained from the Clerk of the Council, County Hall, Westminster Bridge, London, S.E.1, enclosing stamped addressed foolscap envelope.

Canvassing disqualifies. 947

COUNTY BOROUGH OF NORTHAMPTON.

BOROUGH ARCHITECT'S DEPARTMENT.

APPOINTMENT OF CHIEF QUANTITY SURVEYOR.

Applications are invited for the appointment of Chief Quantity Surveyor, in the above Department, in the Salary Scale, A.P.T. Division, Grade VII (£575×£25 to £650 p.a., plus bonus).

Applicants should be Members of the Royal Institution of Chartered Surveyors (Quantities Sub-Division), and should possess the qualifications and experience necessary to enable them to take charge of the whole of the Quantity Surveying work of the Department.

Further particulars of the appointment and form of application may be obtained from the undersigned, to whom applications must be delivered not later than Tuesday, 10th December, 1946.

C. E. VIVIAN ROWE,
Town Clerk.

Guildhall, Northampton. 882

PEMBROKESHIRE COUNTY COUNCIL.

COUNTY ARCHITECT'S DEPARTMENT.

Applications are invited for the undermentioned appointments:—

(*a*) TWO SENIOR ASSISTANT ARCHITECTS. Qualified members of the R.I.B.A. by examination, and having experience of contemporary architectural and/or structural design. Salary scale, A.P. & T., Div. VI, £535-£600, plus bonus (at present £59 16s.), according to qualifications and experience.

(*b*) TWO ASSISTANT ARCHITECTS. Preferably members of the R.I.B.A. by examination, and/or holding equivalent academic qualifications, and having experience of contemporary architectural and/or structural design. Salary scale, A.P. & T., Div. Grade V, £460-£510, plus bonus as above, according to qualifications and experience.

(*c*) TWO ARCHITECTURAL ASSISTANTS. Should have passed the Inter. exam. of the R.I.B.A. and have had good experience in general architectural work, including schemes and the preparation of working drawings. Salary scale, A. P. & T., Div. Grade III, £390-£435, plus bonus as above, according to qualifications and experience.

(*d*) ONE ENGINEERING ASSISTANT. Preferably holding appropriate qualification, and should have had experience in the design and supervision of heating, hot water, and ventilating systems, together with technical knowledge and practical experience in the design of electrical installations for small schemes, and be able to prepare plans, specifications, and carry out supervision of contracts in connection with same. Salary scale, A.P. & T., Div. Grade V, £460-£510 (plus bonus as above), according to qualifications and experience.

(*e*) ONE CHIEF QUANTITY SURVEYOR. Qualified as a member of the Surveyors' Institute by examination, and possessing suitable experience in the practice of quantity surveying, and preferably under a Local Authority. The duties will entail taking charge of a Quantity Surveyor's Section, under the County Architect. Salary scale, A.P. & T., Div. Grade VII, £575-£650, plus bonus as above, according to qualifications and experience.

(*f*) ONE SENIOR QUANTITY SURVEYOR. Should be P.A.S.I. (Qts. Section), and have had considerable experience in the preparation of quantities, specifications, site measuring, estimates, and final accounts. Salary scale, A.P. & T., Div. Grade VI, £535-£600 (plus bonus as above), according to qualifications and experience.

(*g*) ASSISTANT LAND AND BUILDING SURVEYOR. Preference will be given to qualified surveyors, capable of carrying out surveys of lands and building, and preparation of necessary reports, plans, valuations, etc. Salary scale, Grade IV, £460-£510 (plus bonus as above), according to qualifications and experience.

(*h*) CHIEF CLERK. Applicants must have a specialized knowledge of Building Work and Architectural Procedure, and preferably have had experience in a County Architect's Office. The duties will entail taking charge of the Clerical Section under the County Architect. Salary scale, A.P. & T., Div. Grade V, £460-£510 (plus bonus as above), according to qualifications and experience.

All the above appointments will be superannuable, and subject to medical examination. Canvassing will be a disqualification. Applications from persons serving in H.M. Forces should state their position regarding their release. Ex-Service candidates, with experience prior to their war service, will be specially considered. Details of these appointments and forms of application may be obtained from Walter Barrett, M.B.E., A.R.I.B.A., County Architect, County Offices, Haverfordwest, to whom applications should be delivered not later than 14th December, 1946.

W. E. BUFTON,
Clerk of the County Council.

County Offices, Haverfordwest.
14th November, 1946. 897

COUNTY BOROUGH OF CROYDON.

BOROUGH VALUER'S DEPARTMENT.

Applications are invited for the appointment of TEMPORARY ASSISTANTS, in connection with Civil Building Licences; salary will be up to £9 9s. a week inclusive, according to experience and qualifications.

Applicants must be fully conversant with the licensing regulations and directives, and have wide experience of specifications, estimates, and the various building trades.

Application forms may be obtained from the Borough Valuer 71, Park Lane, Croydon, to whom they must be returned as soon as possible. Canvassing will disqualify.

E. TABERNER,
Town Clerk.

Town Hall, Croydon.
November, 1946. 899

EAST SUFFOLK COUNTY COUNCIL.

APPOINTMENT OF SENIOR PLANNING ASSISTANT.

Applications are invited from persons of either sex for the appointment of Senior Planning Assistant, in the County Planning Officer's Department.

The salary will be within the A.P. & T. Division, Grade II, of the National Joint Council's Scale, *viz.*, £360×£15 to £405 per annum, plus bonus, with scale allowance for use of a motor cycle.

Candidates should have had previous experience in the preparation and administration of Planning Schemes and Interim Development procedure, and a sound knowledge of the relevant Acts and Orders, and must possess a recognized qualification in Town Planning.

Canvassing will be a disqualification.

Applications, endorsed "Senior Planning Assistant," stating age, experience, present position and qualifications, and accompanied by copies of three recent testimonials, to be delivered to the undersigned not later than the first post Saturday morning, the 14th December, 1946.

CECIL OAKES,
Clerk of the County Council.

County Hall, Ipswich.
14th November, 1946. 908

PONTYPOOL URBAN DISTRICT COUNCIL.

ARCHITECTURAL ASSISTANT.

Applications are invited for the appointment of Assistant, in the Council's Architectural Department, at a salary of £450, rising by one annual increment of £15 to £465, plus bonus.

The successful applicant will be required to pass a medical examination, the appointment being subject to the Local Government Superannuation Act, and terminable by one month's notice on either side.

Preference will be given to Registered Architects, who have qualified by examination and who have knowledge and experience of Housing and other Architectural work in the service of a local authority.

Applications, giving details of age, training, qualifications and experience, accompanied by copies of three recent testimonials, and endorsed "Architectural Assistant," must be sent to Mr. P. E. Walker, A.R.I.B.A., P.A.S.I., Architect to the Council, Pontymoel, Pontypool, by 7th December, 1946.

H. COOK,
Clerk to the Council.

863

METROPOLITAN BOROUGH OF HACKNEY.

APPOINTMENT OF ARCHITECTURAL ASSISTANTS.

BOROUGH ENGINEER AND SURVEYOR'S DEPARTMENT.

Applications are invited for the appointment, on the permanent establishment, of Architectural Assistants, in the Borough Engineer and Surveyor's Department, at a salary in accordance with Grades IV-V (£420 p.a., rising to £510 p.a.), of the A.P. & T. Division of, and subject to the Scheme of Conditions of Service of, the National Joint Council for Local Authorities' Administrative, Professional, Technical and Clerical Services, plus £20 p.a. London weighting and a cost-of-living bonus, at present amounting to £59 16s. per annum.

The commencing salary will be determined within the grades specified, according to the experience and qualifications of the successful candidates.

Candidates must be Registered Architects, and must be Corporate Members of a Professional Institution, and must have good architectural experience.

The appointments will be terminable by one month's notice on either side, subject to the provisions of the Council's Superannuation Acts, to each of the successful candidates passing a medical examination, and to the Council's Regulations relating to staff appointments.

Applications in writing, on forms to be obtained from the undersigned, on receipt of a stamped addressed envelope, must be returned not later than first post on Friday, 13th December, 1946, endorsed "Architectural Assistant, IV-V, Borough Engineer and Surveyor's Dept."

DUDLEY SORRELL,
Town Clerk.

Town Hall, Hackney, E.8.
7th November, 1946. 917

THE UNIVERSITY OF SHEFFIELD.

Applications are invited for the post of ASSISTANT LECTURER IN ARCHITECTURE.

Salary £450 per annum in the first year, rising by £25 to £500, with superannuation provision under the Federated Superannuation Scheme for Universities, and family allowance.

Candidates should be graduates or diplomates of one of the Schools or Departments of Architecture recognized by the R.I.B.A.

The successful candidate will be expected to enter upon his duties as soon as possible.

Applications (three copies), with the names and addresses of three references and, if possible, copies of two testimonials, should reach the undersigned (from whom further particulars may be obtained) as early as possible, but not later than 14th December, 1946.

A. W. CHAPMAN,
Registrar.

885

CITY OF LEEDS.
CITY ARCHITECT'S DEPARTMENT.

Applications are invited for the following appointments :—

(*a*) ASSISTANT QUANTITY SURVEYORS, Class 2.

The commencing salary will be £390 per annum, rising by annual increments of £15 to a maximum of £435 per annum.

Candidates should have had experience in assisting with taking off Quantities, preparing schedules and specifications, and in the working up and Billing of large contracts.

(*b*) ASSISTANT ARCHITECTS, Class 2.

The commencing salary will be £535 per annum, rising by annual increments of £20 to a maximum of £600 per annum.

(*c*) ASSISTANT ARCHITECTS, Class 2A.

The commencing salary will be £460 per annum, rising by annual increments of £15 to a maximum of £510 per annum.

(*d*) ASSISTANT ARCHITECTS, Class 3.

The commencing salary will be £420 per annum, rising by annual increments of £15 to a maximum of £465 per annum.

(*e*) ASSISTANT ARCHITECTS, Class 3A.

The commencing salary will be £390 per annum, rising by annual increments of £15 to a maximum of £435 per annum.

(*f*) ASSISTANT ARCHITECTS, Class 4.

The commencing salary will be £360 per annum, rising by annual increments of £15 to a maximum of £405 per annum.

(*g*) ASSISTANT ARCHITECTS, Class 4A.

The commencing salary will be £330 per annum, rising by annual increments of £15 to a maximum of £375 per annum.

Candidates for appointments (*b*) to (*g*) must be Registered Architects, and must have had a thorough training and experience in Architectural Design and Construction.

(*h*) JUNIOR ASSISTANT ARCHITECTS, Class 5.

The commencing salary will be according to age, rising to a maximum of £300 per annum.

(*j*) ASSISTANT SURVEYORS, Class 2.

The commencing salary will be £330 per annum, rising by annual increments of £15 to a maximum of £375 per annum.

Candidates should have had extensive experience in surveying and levelling of large sites and buildings.

Cost-of-living bonus, which is additional to the above scales, is at present at the rate of £59 16s. per annum in the case of adult male officers, and £48 2s. in the case of adult female officers.

The first increment will take effect on the 1st April, following the completion of six months' satisfactory service, except in the case of appointment (*h*), where birthday increments are payable.

The appointments will be subject to the Local Government Superannuation Act, 1937, and the successful applicants will be required to pass a medical examination.

Applications, on forms to be obtained from the undersigned, accompanied by copies of not more than three recent testimonials (not returnable), must be received by me in the envelope supplied therefor, not later than 10 a.m. on Friday, 6th December, 1946.

Canvassing in any form, either directly or indirectly, will be a disqualification.

R. A. H. LIVETT, O.B.E., A.R.I.B.A.,
City Architect.

Priestley House, Quarry Hill, Leeds, 9.
November, 1946. 932

COUNTY BOROUGH OF WEST BROMWICH.
APPOINTMENT OF ARCHITECTURAL ASSISTANTS.

Applications are invited for the following permanent appointments :—

(*a*) SENIOR ASSISTANT ARCHITECT. A.P.T., Grade VI (£535-£600).

(*b*) ASSISTANT ARCHITECTS. A.P.T., Grade V (£460-£510).

(*c*) ASSISTANT ARCHITECTS. A.P.T., Grade IV (£420-£465).

All the above salaries are exclusive of the cost-of-living bonus, which it at present at the rate of £59 16s. per annum.

Preference will be given to candidates who are Registered Architects and/or Associate Members of the Royal Institute of British Architects.

The appointments are subject to the provisions of the Local Government Superannuation Act, 1937, to a satisfactory medical examination, and to the termination of each appointment by one month's notice in writing on either side.

Applications, stating age, qualifications, experience, and enclosing copies of three recent testimonials, should reach the undersigned not later than Monday, the 9th day of December, 1946.

JOHN G. JEFFERSON, M.Inst.C.E.,
Borough Engineer and Surveyor.

Town Hall, West Bromwich.
November, 1946. 929

WEST SUSSEX COUNTY COUNCIL.
COUNTY ARCHITECT'S DEPARTMENT.

Applications are invited for the following appointments, on the permanent staff, at salaries in accordance with the National Scales of Salaries :—

(*a*) ONE CHIEF ASSISTANT QUANTITY SURVEYOR (Grade VIII, A.P.T. Division). Commencing salary £625 per annum, rising by three annual increments of £25 to a maximum of £700 per annum. Applicants must be Members of the Royal Institution of Chartered Surveyors (Quantities Sub-Division), with extensive experience. They should be capable of undertaking all stages of the work for the preparation of Bills of Quantities, including preliminary estimates; the preparation and settlement of final accounts; site measurements; and the preparation of interim certificates.

(*b*) ONE ASSISTANT QUANTITY SURVEYOR (Grade V, A.P.T. Division). Commencing salary £460 per annum, rising by two annual increments of £15 and one of £20 to a maximum of £510 per annum. Applicants should possess approved qualifications and experience, and preference will be given to those who are Members of the Royal Institution of Chartered Surveyors (Quantities Sub-Division).

(*c*) ONE ASSISTANT ARCHITECT (Grade IV, A.P.T. Division). Commencing salary £420 per annum, rising by three annual increments of £15 to a maximum of £465 per annum.

(*d*) ONE JUNIOR ASSISTANT ARCHITECT (Grade I, A.P.T. Division). Commencing salary £330 per annum, rising by three annual increments of £15 to a maximum of £375 per annum.

For appointments (*c*) and (*d*) preference will be given to applicants who have passed the whole or part of the examinations of the R.I.B.A.

All the above appointments will carry a cost-of-living bonus, at present £59 16s.

The appointments will be terminable by one calendar month's notice on either side, and will be subject to the provisions of the Local Government Superannuation Act, 1937, and to a medical examination.

Forms of application are not being issued in this instance.

Applications, stating age, qualifications and experience, and full particulars of present and previous appointments, with dates, salaries and designations, together with the names and addresses of three persons to whom reference can be made, must be delivered to F. R. Steele, F.R.I.B.A., F.S.I., M.T.P.I., County Architect, County Hall, Chichester, suitably endorsed, not later than Thursday, the 12th December, 1946.

Canvassing will disqualify, and applicants must disclose whether to their knowledge they are related to any member of the Council or the Head of any Department or his standing Deputy.

T. C. HAYWARD,
Clerk of the County Council.

County Hall, Chichester.
14th November, 1946. 903

METROPOLITAN BOROUGH OF PADDINGTON.
SENIOR ARCHITECTURAL ASSISTANT.

Applications are invited for the appointment of a Senior Architectural Assistant, in the Borough Engineer and Surveyor's Department, at a commencing salary of £460 per annum, plus cost-of-living bonus, at present £59 16s. per annum (£48 2s. for women). The post will be graded under the National Joint Council Scales of Salaries.

Applicants must be Registered Architects, members (by examination) of the R.I.B.A., and have had extensive experience in municipal work, including working class flats. London experience will be an advantage.

Forms of application and conditions of appointment can be obtained from the undersigned, to whom applications are to be returned, not later than 20th December, 1946.

Canvassing, directly or indirectly, will disqualify.

W. H. BENTLEY,
Town Clerk.

Town Hall, Paddington, London, W.2.
22nd November, 1946. 921

BOROUGH OF BALLYMENA.
APPOINTMENT OF TOWN PLANNING OFFICER.

The Ballymena Borough Council require the temporary services of a Town Planning Officer, to prepare a Town Planning Scheme for the Borough, in consultation with the Borough Surveyor. The Scheme will require to be co-ordinated with the Antrim County Scheme.

The person appointed must be at least an Associate Member of the Town Planning Institute, and have had practical planning experience.

The salary for the position will be at the rate of £500 per annum, plus current cost-of-living bonus.

The appointment will be full-time, temporary, and terminable by three months' notice on either side, and preference will be given to ex-Service candidates possessing the required qualifications, provided that the Council is satisfied that such candidates can, or within a reasonable time will be able to, fill the vacant post efficiently. The successful candidate will be required to furnish satisfactory evidence of health.

When appointed the officer will be required to take up duty as soon as possible.

Vouched travelling expenses will be re-couped to applicants selected to attend for interview.

The necessary form of application can be obtained from the undersigned.

Applications, accompanied by copies only of two recent testimonials, are to be enclosed in a sealed envelope marked "Town Planning Officer," and addressed to the undersigned, and will be received not later than the 14th December, 1946.

T. B. WHITESIDE,
Town Clerk.

Town Hall, Ballymena.
12th November, 1946. 924

CITY OF PETERBOROUGH.
APPOINTMENT OF QUANTITY SURVEYOR (GRADE V).

Applications are invited for the appointment of Quantity Surveyor, in the City Engineer and Surveyor's Department, at a salary in accordance with Grade V, A.P.T., £460, rising by annual increments of £510 per annum, plus bonus of £60 per annum.

The work will be mainly in connection with the erection of new schools, and applicants should be experienced in taking-off and preparing Bills of Quantities.

The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful applicant will be required to pass a medical examination.

Applicants, stating age, qualifications and experience, accompanied by copies of at least two recent testimonials, endorsed "Quantity Surveyor," must be delivered to the undersigned not later than Monday, 9th December, 1946.

Canvassing, either directly or indirectly, will be deemed a disqualification.

ARTHUR J. REEVES,
Town Clerk.

Town Hall, Peterborough.
11th November, 1946. 892

CITY OF PETERBOROUGH.
APPOINTMENT OF ARCHITECTURAL ASSISTANT (Grade III).

Applications are invited for the appointment of Architectural Assistant, in the City Engineer and Surveyor's Department, at a salary in accordance with Grade III, A.P.T., £390, rising by annual increments to £435 per annum, plus bonus of £60 per annum.

Applicants should be good draughtsmen, possess a sound knowledge of building construction, and be capable of preparing working drawings under instructions.

The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful applicant will be required to pass a medical examination.

Applicants, stating age, qualifications and experience, accompanied by copies of at least two recent testimonials, endorsed "Architectural Assistant," must be delivered to the undersigned not later than Monday, 9th December, 1946.

Canvassing, either directly or indirectly, will be deemed a disqualification.

ARTHUR J. REEVES,
Town Clerk.

Town Hall, Peterborough.
11th November, 1946. 893

EASINGTON RURAL DISTRICT COUNCIL.
ENGINEER AND SURVEYOR'S DEPARTMENT.

Applications are invited for the appointment of :—

FIRST ARCHITECTURAL ASSISTANT. Grade III, A.P.T. Salary £390-£435 per annum.

Applicants must have served their articles as an Architect, or have had experience as an Architectural Assistant on the design and layout of housing schemes and buildings.

The appointment is subject to the Local Government Superannuation Act, 1937, and successful candidates will be required to pass a medical examination. Service may be terminated by one month's notice on either side.

Applications, stating age, details of qualifications and experience, on a form obtainable from the undersigned, together with copies of two recent testimonials, are to be delivered to the undersigned not later than 7th December, 1946, in a sealed envelope, endorsed "Architectural Assistant."

Canvassing, directly or indirectly, will disqualify.

J. W. GRAY,
Clerk of the Council.

Council Offices, Easington, Co. Durham.
11th November, 1946. 883

HORNCHURCH URBAN DISTRICT COUNCIL.

Applications are invited for the appointment of an ARCHITECTURAL ASSISTANT (permanent), Grade II, at a commencing salary of £360, rising by annual increments of £15 to £405 per annum, plus cost-of-living bonus (at present amounting to £59 16s per annum).

Preference will be given to candidates who are registered Architects, or members of the Royal Institute of British Architects, and who have some knowledge and experience of the preparation of bills of quantities.

The appointment is subject to the Local Government Superannuation Act, 1937, to the appointee successfully passing a medical examination, and to termination, in writing, by one month's notice on either side.

Applications, stating age, qualifications, full particulars of training and experience, accompanied by copies of three recent testimonials, endorsed "Architectural Assistant," must reach the undersigned not later than Friday, the 13th December, 1946.

P. L. COX,
Clerk of the Council.

Council Offices, Billet Lane, Hornchurch.
11th November, 1946. 894

DERBYSHIRE COUNTY COUNCIL.
COUNTY ARCHITECTS' DEPARTMENT.

Applications are invited for the appointment of ASSISTANT SURVEYOR, on the permanent staff.

Conditions of service are in accordance with the National Joint Council Scheme for Local Authorities, as adopted by the County Council.

The salary payable will be under Grade V, commencing at £460, rising to a maximum of £510 per annum, plus cost-of-living bonus, which is at present £59 16s. per annum.

Applicants should be fully qualified in the preparation of estimates for all classes of building work, and should have had experience in measuring up for, and the preparation of, final accounts.

The appointment will be subject to one month's notice on either side, and to the provisions of the Local Government Superannuation Act, 1937.

The selected candidates will be required to pass a medical examination.

Applications, stating age, present position and salary, qualifications and previous experience, accompanied by copies of three recent testimonials, should reach the undersigned not later than 3rd December, 1946.

F. HAMER CROSSLEY, Dipl. Arch., A.R.I.B.A.,
County Architect.

County Offices, St. Mary's Gate, Derby. 925

BOROUGH OF ROYAL TUNBRIDGE WELLS.

Applications are invited for the following appointments in the Borough Surveyor's Department, for the period of approximately three years, on the Grades of the National Scheme indicated opposite each appointment, plus war bonus in each case, at the rate from time to time in force :—

ONE ARCHITECTURAL ASSISTANT. Grade IV (£420—£15—£465).

ONE ARCHITECTURAL ASSISTANT. Grade III (£390—£15—£435).

ONE QUANTITY SURVEYING ASSISTANT. Grade IV (£420—£15—£465).

Successful candidates will be required to contribute under the Local Government Officers' Superannuation Act, 1937, and to pass a medical examination.

Applicants should state, in addition to the usual particulars, whether to their knowledge they are related to any Member or Senior Officer of the Council.

Applications, endorsed with the title of the post applied for, together with the names of not more than three persons to whom reference can be made, should be delivered to Mr. H. P. Bishop, Borough Surveyor, Town Hall, Tunbridge Wells, not later than Saturday, 7th December, 1946.

JOHN WHITEHEAD,
Town Clerk.

Tunbridge Wells. 923

CITY OF COVENTRY.

CITY ARCHITECTURAL DEPARTMENT.

The Corporation of Coventry invites applications from duly qualified persons for the following whole-time permanent appointments, in the City Architectural Department :—

THREE ASSISTANT ARCHITECTS. Salary in accordance with Grade A.P.T., IV (commencing at £420 per annum and rising by three increments of £15 per annum to £465 per annum).

ONE ASSISTANT ARCHITECT. Salary in accordance with Grade A.P.T., II (commencing at £360 per annum and rising by annual increments of £15 per annum to £405 per annum).

ONE ASSISTANT ARCHITECT. Salary in accordance with Grade, A.P.T., I (commencing at £330 per annum, and rising by three increments of £15 per annum to £375 per annum).

ONE JUNIOR ARCHITECTURAL ASSISTANT. Salary in accordance with the General Grade, which is an "age" grade, *e.g.*, salary at 21 years £160 per annum; maximum £300 per annum at age 30.

ONE HEATING AND VENTILATING ENGINEER, who must be a qualified member of the Institute. Salary in accordance with Grade A.P.T., V (commencing at £460 per annum, and rising by two increments of £15 per annum and one of £20 per annum to £510 per annum.

TWO SENIOR QUANTITY SURVEYORS. Salary in accordance with Grade A.P.T., IV (commencing at £420 per annum and rising by three increments of £15 per annum to £465 per annum).

ONE QUANTITY SURVEYOR. Salary in accordance with Grade A.P.T., III (commencing at £390 per annum, and rising by three increments of £15 per annum to £435 per annum).

ONE ASSISTANT QUANTITY SURVEYOR. Salary in accordance with Grade A.P.T., I (commencing at £330 per annum, and rising by three increments of £15 per annum to £375 per annum).

Salary increments are subject to satisfactory service. The above salaries are exclusive of the Council's cost-of-living bonus, which may vary, but which at present amounts to 23s. per week for men and 18s. 6d. for women.

The posts are subject to one month's notice on either side, and to the provisions of the Local Government Superannuation Acts, as amended in regard to annuities to widows by the Coventry Corporation Act, 1936, and a satisfactory certificate will be requisite from the Council's Medical Referee. The successful male applicants will be required to contribute to the Coventry Municipal Officers' Widows' and Orphans' Pensions Fund.

Applications must be made on the forms obtainable from the undersigned, and should be returned complete, together with copies of not more than two recent testimonials, or names of two persons to whom reference may be made, not later than Wednesday, the 18th December, 1946.

Canvassing, directly or indirectly, will be a disqualification.

D. E. E. GIBSON,
City Architect.

1a, Warwick Row, Coventry.
21st November, 1946. 896

METROPOLITAN BOROUGH OF SHOREDITCH.
BOROUGH ENGINEER AND SURVEYOR'S DEPARTMENT.

Applications are invited for the position of JUNIOR ARCHITECTURAL ASSISTANT.

The salary will be £7 7s. per week, plus a cost-of-living bonus, at present £59 16s. per annum.

The appointment will be temporary in the first instance, but will be reviewed after six months' service with a view to the appointment being made permanent.

Applicants should have had experience in Municipal Housing schemes, and preference will be given to holders of an appropriate qualification.

Applications, endorsed "Junior Architectural Assistant," stating age, qualifications and experience, with copies of three recent testimonials, to be delivered to the undersigned not later than Monday, 16th December, 1946.

R. CYRIL RAY,
Town Clerk.

Town Hall, Old Street, London, E.C.1. 936

RURAL DISTRICT OF CANNOCK.
JUNIOR ARCHITECTURAL ASSISTANT.

Applications are invited for the appointment of Junior Architectural Assistant, in the Surveyor's Department.

Salary will be £255 to £300, according to qualifications and experience, plus cost-of-living bonus, at present £59 16s. per annum.

The appointment will be of a temporary nature, and will be terminable by one month's notice on either side.

Applicants must have had a thorough architectural training, and must be capable of preparing working drawings from sketch plans, half inch and full size details, etc., and must be neat and expeditious draughtsman.

Preference will be given to applicants who are up to the standard of Inter. R.I.B.A.

Applications, endorsed "Junior Architectural Assistant," stating age, qualifications and experience, accompanied by copies of two recent testimonials, must be sent to the undersigned, Council Offices, Penkridge, Stafford, not later than 14th December, 1946.

A. D. DALLOW,
Clerk to the Council.

Council Offices, Penkridge, Staffs. 934

DEVON COUNTY COUNCIL.

Applications are invited for the following appointments, in the County Planning Department :—

(*a*) SENIOR PLANNING ASSISTANT, at a salary in accordance with Grade V of the National Scale of Salaries (£460 per annum, rising to £510 per annum), plus cost-of-living bonus, at present £59 16s. per annum, and car allowance on the County scale.

Applicants must have had considerable experience in the preparation and administration of Town Planning schemes for urban and rural areas, including supervision of staff, and must be Corporate Members of the Town Planning Institute.

(*b*) DRAUGHTSMAN, at a salary according to age and experience, but not exceeding £300 per annum, plus cost-of-living bonus.

Applicants should be good draughtsman and colourers, and experience in the preparation of maps and plans in connection with Town and Country Planning will be an advantage.

The above appointments will be subject to one month's notice on either side, and to the provisions of the Local Government Superannuation Act, 1937. The persons appointed will be required to pass a medical examination.

Applications, giving full particulars of age, qualifications, experience, and present and past appointments, accompanied by copies of three recent testimonials, must be submitted to the undersigned not later than 16th December, 1946.

A. J. WITHYCOMBE,
Clerk of the County Council.

The Castle, Exeter. 940

CITY OF BATH.
CITY ENGINEER'S DEPARTMENT.
SENIOR ARCHITECTURAL ASSISTANT.

Applications are invited for the appointment of Senior Architectural Assistant, in the Architectural Section of the City Engineer's Department, at a salary of £460, rising to £510 per annum (Grade V), plus cost-of-living bonus, which is at present £1 3s. weekly.

The person selected will be required to pass a medical examination before the appointment is confirmed, and to contribute to the Corporation's Superannuation Fund.

Applicants should be Registered Architects, and preferably Associates of the R.I.B.A., possessing good experience of architectural design and construction, particularly in regard to housing estates and other work as undertaken by a Local Authority.

Applications should be addressed to the City Engineer, Guildhall, Bath, and should arrive not later than 6th December, 1946. They should state age, qualifications, experience, and when available if appointed. Copy of one testimonial and names of two referees should be included.

Canvassing, directly or indirectly, is prohibited. Candidates should disclose whether or not, to their knowledge, they are related to a member of the City Council or a Chief Official.

The National Scales of Salaries and Conditions of Service have been adopted by the Council.

J. BASIL OGDEN,
Town Clerk.

Guildhall, Bath.
14th November, 1946. 933

CITY OF OXFORD.
APPOINTMENT OF CITY ARCHITECT.

Applications are invited for the permanent post of City Architect, at a salary of £1,300 a year, plus bonus at the current rate. The Council intends in due course to review the salaries of Chief Officers, including that assigned to the post of City Architect. A car allowance will also be made. If necessary, housing accommodation will be made available.

Further particulars can be obtained from me, together with application forms, which must be returned to me by the 21st December, 1946.

Canvassing of members of the Oxford City Council, either directly or indirectly, in connection with this appointment will disqualify the candidate.

HARRY PLOWMAN,
Town Clerk.

Town Hall, Oxford. 935

CITY OF LEICESTER EDUCATION COMMITTEE.
COLLEGE OF ART AND CRAFTS.
SCHOOL OF ARCHITECTURE AND BUILDING.

Applications are invited for the following full-time posts :—

(1) STUDIO INSTRUCTOR IN DESIGN AND CONSTRUCTION to Students up to the R.I.B.A. Intermediate standard.

(2) LECTURER IN BUILDING SCIENCE to Students in Architecture and Building (including National Certificate and Craft Science).

Salary in accordance with the Burnham Scale.

Successful applicants will be required to take up their duties in January, 1947.

Applications, together with copies of recent testimonials, should be addressed to The Principal, College of Art, The Newarke, Leicester.

ELFED THOMAS,
Director of Education.

Education Department, Newarke Street, Leicester. 937

FIFE COUNTY COUNCIL.
HOUSING ARCHITECT'S DEPARTMENT—CUPAR.

Applications are invited for the appointment of an ARCHITECTURAL ASSISTANT, in the County Housing Architect's Department. Applicants must be qualified Architects under 45 years of age, with previous experience of Local Authority Schemes, particularly Housing. Salary will be £400 per annum, plus war increase of £90 per annum. The appointment is superannuable, and the successful candidate will require to undergo a medical examination. Applications, stating age, qualifications, and experience, accompanied by copies of testimonials, must be lodged with the undersigned not later than 5th December, 1946.

J. M. MITCHELL,
County Clerk.

County Buildings, Cupar-Fife.
18th November, 1946. 938

LITTLEHAMPTON URBAN DISTRICT COUNCIL.
ENGINEER AND SURVEYOR'S DEPARTMENT.
APPOINTMENT OF ARCHITECTURAL ASSISTANT (GRADE III).

Applications are invited for the appointment of an Architectural Assistant, in the Engineer and Surveyor's Department, at a salary in accordance with Grade III, A.P.T. Division, namely £390, rising by three annual increments to £435, plus cost-of-living bonus, at present £59 16s. per annum.

Preference will be given to candidates who have passed the final examination of the Royal Institute of British Architects. Applicants must have had good architectural experience, including housing, be good draughtsmen, and experienced in the preparation of Specifications and Bills of Quantities. Candidates must also have had experience with a Local Authority, and be accustomed to the supervision of works in progress.

Applications, stating age, qualifications, and experience, together with copies of three recent testimonials, should be forwarded to the undersigned not later than Monday, 9th December, 1946.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and will be terminable by one month's notice on either side. The successful candidate will be required to undergo a medical examination.

L. B. BERESFORD,
Clerk of the Council.

Council Offices, Manor House, Littlehampton. 939

CORPORATION OF GLASGOW—HOUSING DEPARTMENT.

Applications are invited for the undernoted appointments :—

QUANTITY SURVEYORS (FIRST GRADE).

Applicants should be Professional Associates of the Chartered Surveyors' Institution, and should have experience in taking off quantities from plans, preparing schedules and specifications, making up interim payments, probable costs and valuations, measuring up and adjusting final measurements, for all trades and for all classes of work, and should have some knowledge of the analysis of builders' prices.

QUANTITY SURVEYORS (SECOND GRADE).

Applicants should have completed their apprenticeship, and should have passed the Intermediate Examination of the Chartered Surveyors' Institution, and should have experience in taking off quantities from plans and preparing schedules and specifications and measuring up and preparation of final measurements for housing contracts.

Salary Scales—First Grade Assistants.—£440 per annum, rising by annual increments of £20 to £550 per annum, plus war increase £90 per annum.

Second Grade Assistants (if having passed only Intermediate Examination of the Chartered Surveyors' Institution).—£200 per annum, rising by annual increment of £20 to £320 per annum, plus war increase £78 per annum.

Second Grade Assistants (if Professional Associate of the Chartered Surveyor's Institution).—£260 per annum, rising by annual increments of £20 to £420 per annum, plus war increase, £78 per annum on minimum salary, graduated to £90 on maximum salary.

The war increase is subject to modification.

The appointments are permanent, and the successful applicants will require to pass a medical examination for admission to the Corporation Superannuation Scheme.

Applications, stating age, particulars of previous training, experience and qualifications, should be addressed to the undersigned in an envelope indicating on the top left-hand corner the position for which application is made, and should be received not later than 14th December, 1946.

RONALD BRADBURY,
Director of Housing.

Housing Department, 20, Trongate, Glasgow, C.1. 912

COUNTY BOROUGH OF HUDDERSFIELD.
EDUCATION COMMITTEE.
TRAINING COLLEGE FOR TECHNICAL TEACHERS.

Applications are invited from suitably qualified men and women for appointments to the staff of the new Training College for Technical Teachers, which will open in Huddersfield early in 1947.

Applicants should have qualifications and teaching experience in one of the following :—

Building.
Commerce.
Engineering.
Science.

There will also be a vacancy for a man or woman with pedagogical experience in Teacher Training.

Suitable applicants may be offered immediate appointments as Senior Lecturers.

Salary in accordance with Training College Scales :—

(*a*) Senior Lecturers : Men, £600×£20 to £750 per annum; women, £500×£20 to £650 per annum.

(*b*) Lecturers : Men, £400×£20 to £650 per annum; women, £350×£20 to £550 per annum.

Initial salary dependent on industrial and teaching experience.

Application forms and further particulars (stamped, addressed envelope) from H. Kay, Esq., Director of Education, Education Offices, Peel Street, Huddersfield, to whom applications should be returned immediately. 911

BOROUGH OF SOUTHALL.
APPOINTMENT OF ARCHITECTURAL ASSISTANT.

Applications are invited for the following permanent appointment, in the Department of the Borough Engineer :—

Architectural Assistant, at a commencing salary of £440 per annum, rising to £455 per annum (both salaries being inclusive of London weighting), and in addition a cost-of-living bonus of £59 16s. per annum will be paid.

Applicants should be registered architects and have experience in housing design.

Housing Accommodation.—The Council will do all in its power to assist the successful candidate to obtain housing accommodation in the Borough.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, on forms to be obtained from the Borough Engineer, Town Hall, Southall, must be returned, accompanied by copies of two recent testimonials, on or before 10th December, 1946.

Canvassing any Member of the Council or any Committee thereof, directly or indirectly, will disqualify.

M. LINDSAY TAYLOR,
Town Clerk.

Town Clerk's Offices, Southall.
November, 1946. 908

CITY OF LIVERPOOL.

ARCHITECTURAL AND HOUSING DEPARTMENT.

The Council of the City of Liverpool invite applications from members of the Royal Institute of British Architects for appointment to the post of CHIEF ARCHITECT, in the Department of the City Architect and Director of Housing, at the salary of £900 per annum, plus war bonus (at present £59 19s. 3d. per annum).

The duties of the appointment involve the supervision of a staff of architects employed in the general architectural work of the Corporation, *i.e.*, schools, hospitals, and other public buildings, etc., but not Housing, which is carried on by a separate section of the architectural staff under a Chief Architect at the same salary as the post advertised.

Applicants, whose age must not exceed 45 years, must have had professional experience, preferably in local or central government service.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the Standing Orders of the City Council, which include requirements to pass a medical examination, to devote whole time to the duties of the appointment, and to reside within the City.

The appointment will be determinable by three calendar months' notice on either side.

Applications, on forms to be obtained from the City Architect and Director of Housing, Blackburn Chambers, Dale Street, Kingsway, Liverpool, 2, accompanied by copies of three recent testimonials, must be addressed to the City Architect and Director of Housing (endorsed "Chief Architect"), and should be received on or before the 2nd December, 1946.

Candidates serving in H.M. Forces abroad need not complete the official form of application, but may submit direct applications on or before the date specified, giving particulars of age, education, qualifications and experience, and three names as references. The number of the applicant's release group and probably date of release should also be stated.

Canvassing of members of the City Council, either directly or indirectly, will be a disqualification.

W. H. BAINES,
Town Clerk.

Municipal Buildings, Liverpool, 2.
October, 1946. 800

THE UNIVERSITY OF LIVERPOOL.

LIVERPOOL SCHOOL OF ARCHITECTURE.

Applications are invited for two full-time posts of LECTURER and STUDIO INSTRUCTOR, in the School of Architecture, at a salary between £450-£600 per annum, according to qualifications and experience, together with child allowances.

Applications, accompanied, if possible, by drawings or photographs of work, two testimonials, and the names of two referees, should be received not later than 31st December, 1946, by the undersigned, from whom further particulars may be obtained.

STANLEY DUMBELL,
Registrar.

November, 1946. 859

GOVERNMENT OF NORTHERN IRELAND.
MINISTRY OF FINANCE
(WORKS AND PUBLIC BUILDINGS).
APPOINTMENT OF ARCHITECTURAL ASSISTANTS.

Applications are invited for a number of (temporary) appointments as Architectural Assistants for general drawing office duties, in connection with the preparation of working drawings and details. Preference will be given to candidates who have passed the Intermediate examination of the R.I.B.A., or who have pursued a recognized course of training, combined with some experience in an Architect's office.

Remuneration.—Successful candidates will be remunerated within the salary range £300-£540 (inclusive), and the commencing salary within this range will be fixed according to the ability and experience of successful candidates.

Although the appointments will be temporary, it is expected that they will last for at least two years, and that a limited number of permanent appointments will eventually be made on a competitive basis.

Preference will be given to candidates who served with H.M. Forces during the 1914-18 or the 1939-45 war, providing the Ministry is satisfied that such candidates can, or, within a reasonable time, will be able to discharge the duties of the post efficiently.

Closing date for receipt of applications.—Applications must reach the Assistant Secretary (Establishments), Ministry of Finance, Stormont, Belfast, on or before the 12th December, 1946. Applicants should state their date of birth, and give full particulars of qualifications and experience. They should also enclose copies of two recent testimonials.

NOTE.

This advertisement supersedes that part of the Ministry's recent advertisement inviting applications for posts on the salary range £250-£450, plus bonus. Candidates who have applied under the previous advertisement will be treated as applying under this advertisement. 915

BOROUGH OF FINCHLEY.
HOUSING AND TOWN PLANNING DEPARTMENT.
APPOINTMENT OF ARCHITECTURAL DRAUGHTSMAN.

Applications are invited for the appointment of an Architectural Draughtsman, at a salary of £255, rising by annual increments of £15 to £300 per annum, plus £20 per annum London weighting and cost-of-living bonus, at present £59 16s. per annum (Miscellaneous Division, Grade I, National Scheme of Conditions of Service).

Applicants should have had experience in architectural work undertaken by a local authority, including the preparation of working and detail drawings.

The successful candidate will be required to pass a medical examination by the Council's Medical Officer of Health, and to contribute to the Corporation's Scheme under the provisions of the Local Government Superannuation Act, 1937.

It will be necessary for the person appointed to make his own arrangements for housing accommodation.

Applications, stating age, qualifications, and previous experience, accompanied by copies of three recent testimonials, must be delivered to Mr. C. R. Edwards, A.M.T.P.I., M.R.San.I., Borough Housing and Town Planning Officer, The Avenue, Finchley, N.3, not later than Wednesday, 11th December, 1946.

Canvassing, directly or indirectly, will disqualify.

R. M. FRANKLIN,
Town Clerk.

Municipal Offices, Finchley, N.3.
22nd November, 1946. 922

METROPOLITAN BOROUGH OF HACKNEY.
APPOINTMENT OF ARCHITECTURAL ASSISTANT.
BOROUGH ENGINEER AND SURVEYOR'S DEPARTMENT.

Applications are invited for the appointment, on the permanent establishment, of an Architectural Assistant, in the Borough Engineer and Surveyor's Department, at a salary in accordance with Grade VI (£535 per annum, rising to £600 per annum) of the A. P. & T. Division of, and subject to the Scheme of Conditions of Service of, the National Joint Council for Local Authorities' Administrative, Professional, Technical and Clerical Services, plus £20 p.a. London weighting and a cost-of-living bonus, at present amounting to £59 16s. p.a.

The commencing salary will be determined within the Grade, according to the experience and qualifications of the successful candidate.

Candidates must be Professional Associates of the Surveyors' Institute, and an architectural qualification will be an advantage. Candidates must also have had good architectural and building experience in the repair and maintenance of Corporation buildings, etc.

The appointment will be terminable by one month's notice on either side, subject to the provisions of the Council's Superannuation Acts, to the successful candidate passing a medical examination, and to the Council's Regulations relating to staff appointments.

Applications in writing, on forms to be obtained from the undersigned, on receipt of a stamped addressed envelope, must be received not later than first post on Friday, 13th December, 1946, endorsed "Architectural Assistant, Grade VI, Borough Engineer and Surveyor's Dept."

DUDLEY SORRELL,
Town Clerk.

Town Hall, Hackney, E.8.
7th November, 1946. 916

Amended Advertisement.

BOROUGH OF HYDE.
BOROUGH SURVEYOR AND WATER ENGINEER'S DEPARTMENT.
APPOINTMENTS VACANT.

The Council invite applications for the following appointments, which will be subject to the National Scheme of Conditions of Service and the Local Government Superannuation Act, at the salaries stated below (together with cost-of-living bonus, at present £59 16s. p.a.). Successful applicants will be required to pass a medical examination, and will be found housing accommodation, when available.

ARCHITECTURAL AND TOWN PLANNING ASSISTANTS.

Two at £390×£15—435 per annum.

Applicants must have experience in layout of sites and design for housing estates and other municipal buildings, preparation of quantities, and Town Planning practice.

CIVIL ENGINEERING ASSISTANTS.

Two at £390×£15—£435 per annum.

Applicants must have experience in water supply, sewerage, main drainage, street lighting, general Municipal engineering, and preferably Town Planning.

All applicants must have reached a standard of qualification by recognized professional examination appropriate to the posts.

Copies of testimonials should accompany applications, which are to be delivered to the undersigned not later than Saturday, 21st December, 1946.

JOHN BINNS,
Town Clerk.

Town Hall, Hyde.
18th November, 1946. 926

Amended Advertisement.

IRLAM URBAN DISTRICT COUNCIL
APPOINTMENT OF ARCHITECTURAL ASSISTANT.

Applications are invited for the appointment of an Architectural Assistant, in the Engineer and Surveyor's Department.

The appointment is of a temporary nature to cover a period of approximately four years, and will be terminable by one month's notice in writing on either side. Salary at the rate of £400 per annum, plus cost-of-living bonus (at present £59 16s. per annum).

Candidates should have had a good knowledge of the preparation of plans, specifications, and quantities; experience in Local Authorities Housing Schemes, and the design of municipal buildings, will be an advantage, and preference will be given to those holding a recognized qualification.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Further particulars regarding the appointment may be obtained from Mr. Henry Nurse, F.R.I.B.A., Engineer and Surveyor to the Council.

Applications, stating age, qualifications and experience, and accompanied by copies of not more than three recent testimonials, should be endorsed "Architectural Assistant," and be received by the undersigned not later than 10 a.m. on Monday, 9th December, 1946.

Canvassing, directly or indirectly, will disqualify.

EDWIN JONES,
Clerk of the Council.

Council Offices, Irlam, near Manchester. 944

BOROUGH OF ROYAL LEAMINGTON SPA.
DEPARTMENT OF DIRECTOR OF HOUSING.
APPOINTMENT OF ASSISTANT ARCHITECT.

Applications are invited for the above appointment, at a basic salary of £390, rising by annual increments of £15 to £435, plus cost-of-living bonus, at present approximately £60 per annum.

Living accommodation may be made available to the successful applicant if required.

The appointment will be on the unestablished staff of the Corporation, terminable by one calendar month's notice on either side.

Candidates must be qualified Architects, and should have had a thorough training in design and construction, and be experienced in the preparation of sketch plans, working drawings and specifications, particularly in relation to flats, housing estates, and buildings related thereto.

Applications must be made on the appropriate forms, which can be obtained at the address given below, and must be returned, together with not more than three testimonials, before 12 noon on Saturday, the 14th December, 1946, endorsed "Assistant Architect."

H. FEDESKI, A.R.I.B.A., Dip.T.P., A.M.T.P.I.,
Director of Housing.

Town Hall Annex, 3, Regent Grove, Leamington Spa.

21st November, 1946. 951

BOROUGH OF WATFORD.
BOROUGH ENGINEER'S DEPARTMENT.
APPOINTMENT OF QUANTITY SURVEYOR.

Applications are invited for the permanent appointment of a Quantity Surveyor, in the Borough Engineer's Department.

Salary on Grade V, A.P.T., of the National Scale, £460 per annum, rising, subject to satisfactory service, to £510 per annum, plus cost-of-living bonus, at present £59 16s. per annum.

Applicants should hold an appropriate professional qualification, and be accustomed to the preparation of Bills of Quantities, Specifications, Estimates, and settlement of final measurements, in connection with Housing Estates. Public building and general building work under the Local Authority.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, stating age, qualifications, present and past appointments, and full details of experience, together with copies of two testimonials, must be sent to Mr. F. C. Sage, Assoc. M.Inst.C.E., M.Inst.M. & C.E., Borough Engineer and Surveyor, Town Hall, Watford, not later than Tuesday, 10th December, 1946, endorsed "Quantity Surveyor."

A. NORMAN SCHOFIELD,
Town Clerk.

Town Hall, Watford.
November, 1946. 949

BOROUGH OF HARROGATE.
SENIOR PLANNING ASSISTANT.

Applications are invited for the appointment of Senior Planning Assistant, in the Borough Engineer's Department, at a salary in accordance with the National Scale of Salaries, A.P.T., Grade IV, commencing at £420, and rising by annual increments of £15 to a maximum of £465 per annum, plus cost-of-living bonus.

Applicants should be Associate Members of the Town Planning Institute, and have had experience in the preparation and administration of Statutory Planning Schemes and the control of interim development. Preference will be given to applicants who possess also a qualification in engineer and/or architecture.

The appointment will be terminable by one month's notice on either side, and the successful candidate will be required to pass a medical examination. The appointment is subject to the provisions of the Local Government Superannuation Act, 1937.

Applications, stating age, qualifications, and previous experience, together with copies of two recent testimonials, and the name of one person for reference, should be submitted in envelopes endorsed "Senior Planning Assistant," to reach the Borough Engineer, Borough Engineer's Department, Municipal Offices, Harrogate, not later than Friday, the 13th December, 1946.

Canvassing, either directly or indirectly, will be a disqualification.

Candidates, when making application, must disclose in writing whether to their knowledge they are related to any member of, or the holder of, any senior office under the Council.

J. M. DODDS,
Town Clerk.

Town Clerk's Office, Municipal Offices, Harrogate.

November 20, 1946. 950

LONDON COUNTY COUNCIL.
CLERKS OF WORKS.

Applications are invited for positions of Clerks of Works (Class II), in the Architect's Department, to supervise constructional, maintenance, and repair works at the Council's schools, hospitals, and other buildings. There may also be shortly a few Class I positions. Rates of pay (according to qualifications and experience) are: Class I, £360-£400 a year (basic), plus cost-of-living addition, at present £78-£90 a year; Class II, up to 135s. a week, plus cost-of-living addition, at present, of 30s. a week.

Successful candidates, under 55 years of age, will be subject to the Council's Superannuation and Provident Fund, but will be temporary in the first instance.

Other things being equal, preference will be given to persons registered under the Disabled Persons' (Employment) Act, 1944, and ex-Service men will also receive special consideration.

Applications (enclosing stamped addressed envelope) to be made to the Architect to the Council, County Hall, Westminster Bridge, S.E.1, for form of application.

Canvassing disqualifies. 955

COUNTY BOROUGH OF SOUTHAMPTON.
BOROUGH ARCHITECT'S DEPARTMENT.

Applications are invited for the following appointments:—

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R. RONALD H. MEGGESON,
Town Clerk.

904

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JUNIOR DRAUGHTSMAN (Architectural) required immediately.—Apply, giving particulars, salary required, etc., to Samuel Jackson & Son, Dean House, 19, Piccadilly, Bradford. 807

ARCHITECT'S ASSISTANT wanted for design and construction of theatres and general work; must be capable and experienced in design, details and specifications; to work under company's architect in Central London and start immediately; salary according to experience and qualifications, with good prospects for permanent responsible position. Write fully, stating age, experience, and salary required, to Box 888.

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ARCHITECTURAL ASSISTANT (young lady), neat draughtswoman, able to prepare drawings from sketches, details, etc., seeks progressive position in London office; 2 years' general D.O. experience; 3rd year Polytechnic student. Reply Box 186.

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W. F.