The Architects' Journal
October 18 1961 Vol 134 No 16 Price 1s

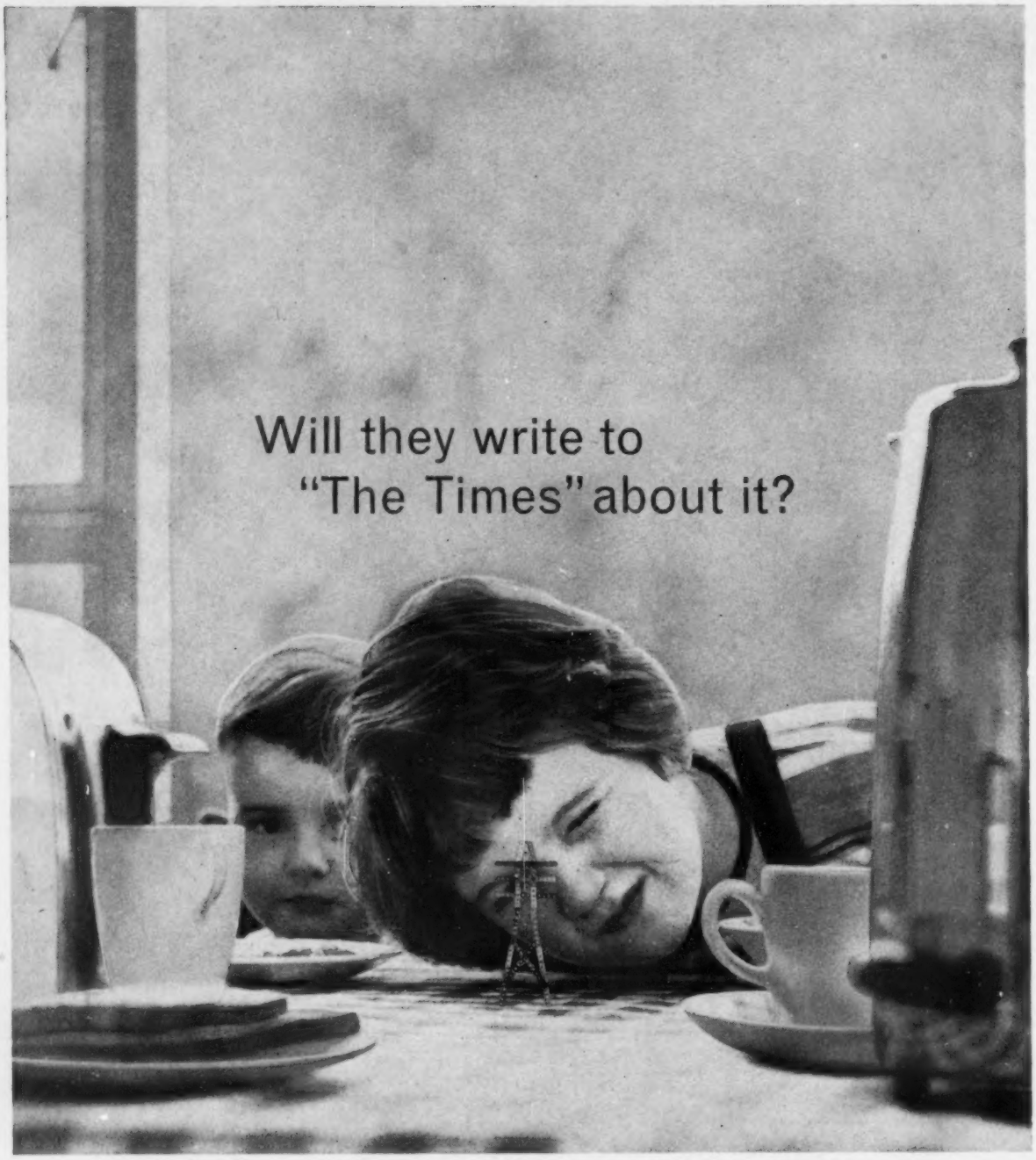
SfB (14)

This issue of the AJ should be filed as it contains two parts of a 50-part technical information library which the AJ is founding. For the normal AJ cover we have substituted the most important elements from Table 1 of the SfB classification. These are the key to our library production programme, and each week we shall publish, with the normal AJ, a supplement dealing with one of these elements. Headings in bold type are those dealt with in previous issues. This week's supplement covers SfB (14). The remainder will be published in subsequent issues. This is a token preclassified file cover for the Element File technical studies, Element Design Guide and Information Sheets within and for all subsequent articles and digests on these subjects which an architect needs to keep. At the end of a year readers will have a design manual covering all the functional elements listed below. This will form the nucleus of a technical library.

(11) Ground : General
(12) Drainage : General
(13) Retaining structures

(14) Roads and pavings: General

(15) Garden: General
(15) Garden: Fences, gates, walls
(16) Foundations: General
(2) Structures: General
(2) Structures: Concrete: General
(2) Structures: Sections, metal
(2) Structures: Sections, wood
(21) Walls: External load-bearing: General
(21) Walls: External non-loadbearing: General
(22) Partitions: General
(23) Floors, ground: General
(23) Floors, structural: General
(24) Stairs and ramps; General
(25) Ceilings, suspended: General
(26) Roofs, structural, flat: General
(27) Roofs, structural, pitched: General
(30) Accessories, ironmongery: General
(31) Windows: General
(31) Windows: Sections, metal
(31) Windows: Sections, wood
(32) Doors: General
(34) Handrails and balustrades: General
(37) Roof-lights and traps, etc.: General
(38) Roof eaves, verges, gutters, rails: General
(41) Finishes, external: General
(42) Finishes, internal: General
(43) Finishes, floor: General
(46) Finishes, flat roofs
(47) Finishes, pitched roofs: General
(51) Installations, refuse disposal: General
(52) Installations, drainage and sanitation: General
(53) Installations, water, hot and cold: General
(54) Installations, gas, compressed air, steam, refrigeration: General
(56) Installations, heating: General
(56) Installations, heating: Equipment and fuel
(57) Installations, ventilation, air conditioning: General
(63) Installations, electrical: Lighting and power: General
(63) Installations, electrical: Lighting equipment
(64) Installations, communications: General
(66) Installations, mechanical: General
(68) Installations, special: General
(72) Rooms, fixtures and equipment: General (fixed furniture)
(72) Rooms, fixtures and equipment: General (loose furniture)
(73) Kitchens, fixtures and equipment: General
(74) Cloakrooms, bathrooms and lavatories, fixtures and equipment: General
(75) Laundries, fixtures and equipment: General



By the time these children are ten years older, Britain's power demands will have doubled. But the number of transmission towers will *not* have doubled. On the contrary — because the Central Electricity Generating Board is adopting 400,000 volt transmission, fewer new towers will be needed. The new power system will use some existing towers, suitably reinforced, and a limited number of new, slightly taller ones. By Act of Parliament, the C.E.G.B. must provide an efficient, economical electricity supply, while preserving visual amenity as far as possible.

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who make and supply electricity to 12 Area Electricity Boards in England and Wales (which re-sell to consumers) and British Railways.

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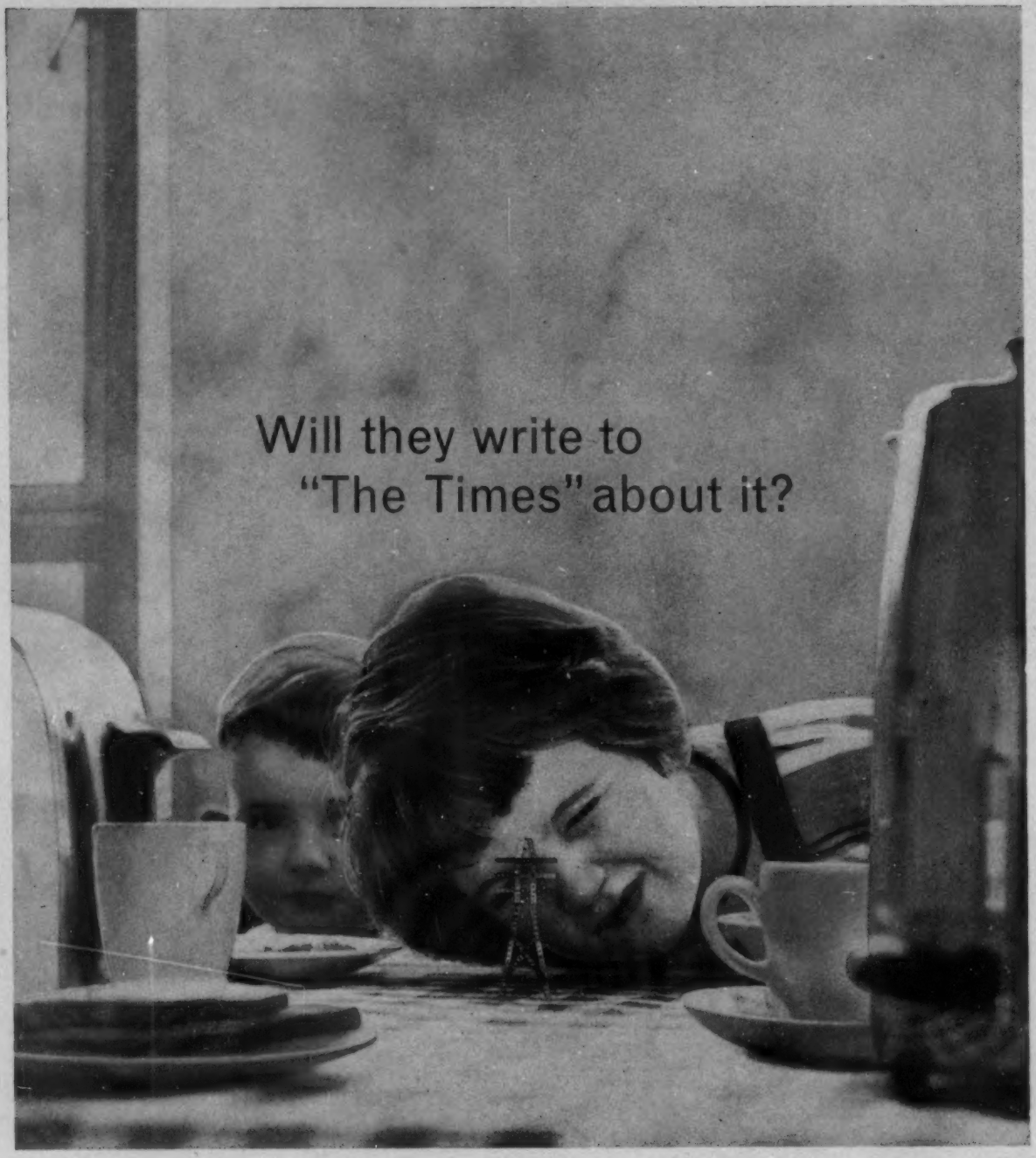
BP 135 (a)



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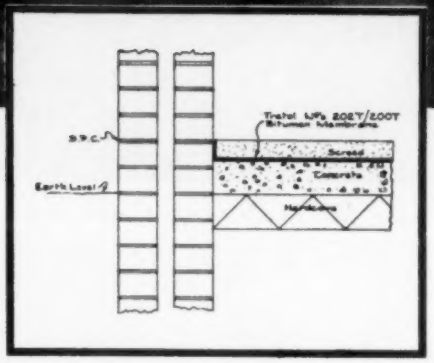

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CRICKET PAVILION, WEST HARNHAM, SALISBURY.
Photograph by courtesy of The City Engineer, City of New Sarum.

TEMPORARY CLASSROOMS, SPEEDWELL SECONDARY BOYS' SCHOOL.
Photograph by courtesy of The Chief Education Officer, City & County of Bristol.

STORAGE BUILDING AT TENBY, PEMBS.
Photograph by courtesy of The South Wales Electricity Board (West Wales Area).

Full details of the buildings shown, and all Thorns Building Systems, are given in their New Catalogue which is unique, in that it gives at a glance, sizes, prices, plans and specifications. It is available, free, to bona fide enquirers.

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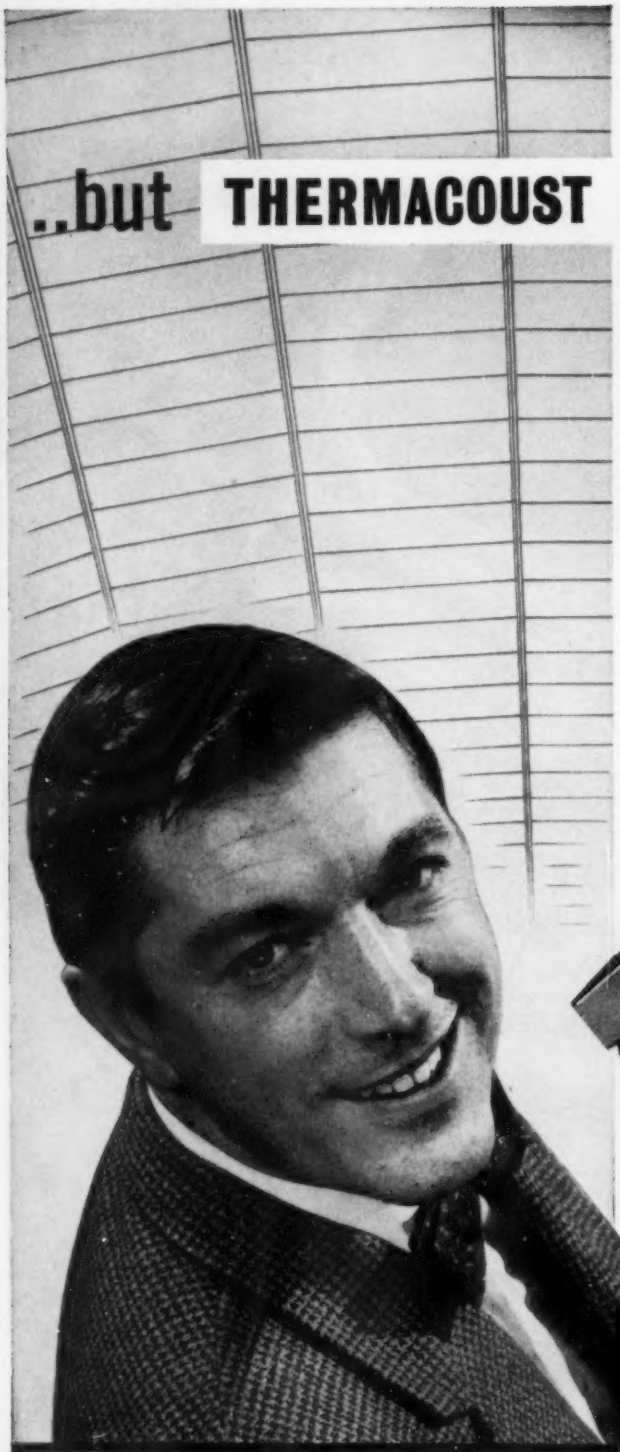

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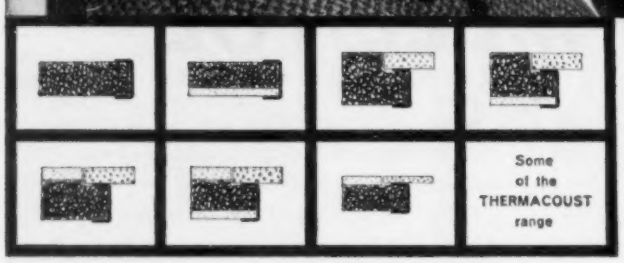

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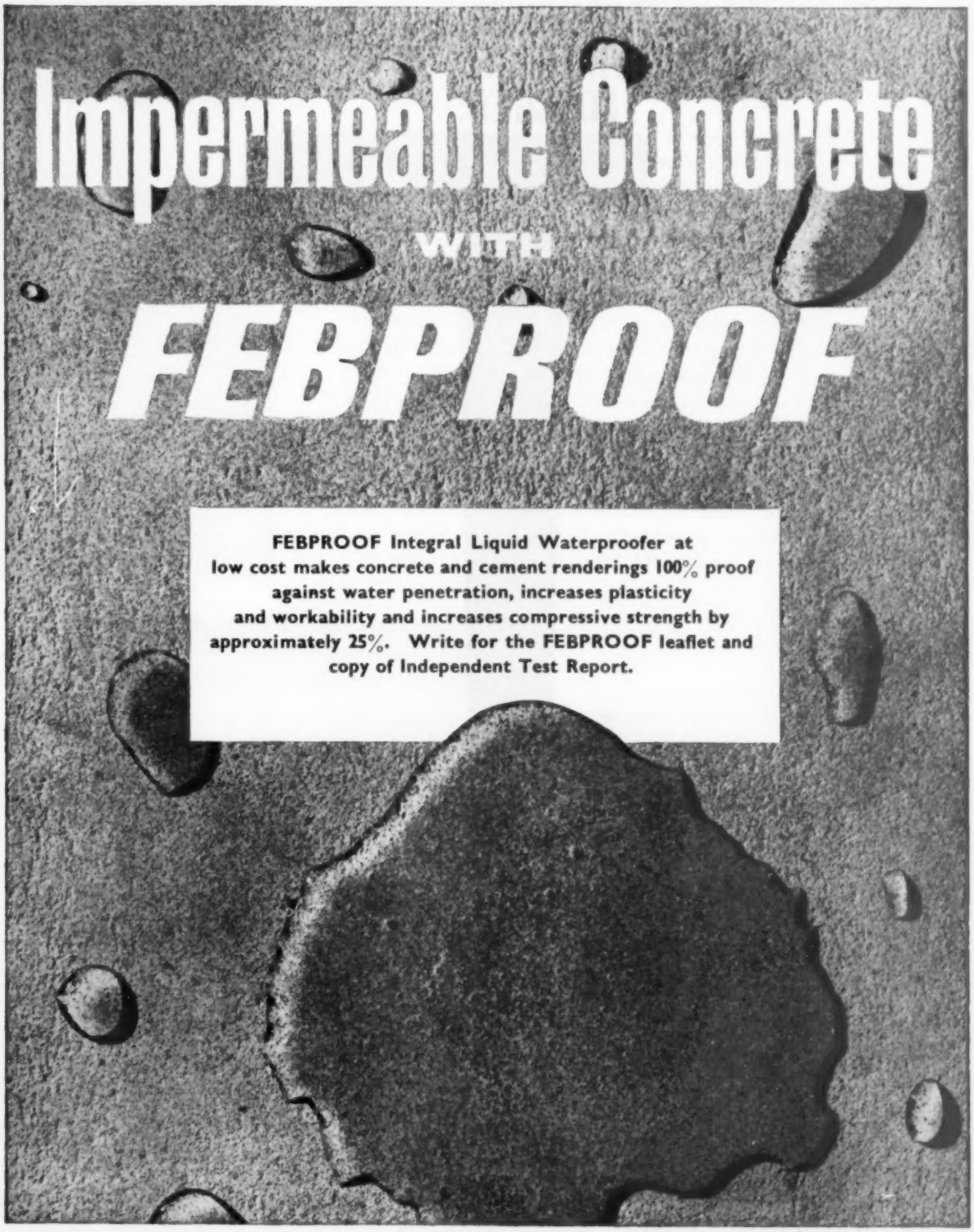

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FROM TOP TO BOTTOM

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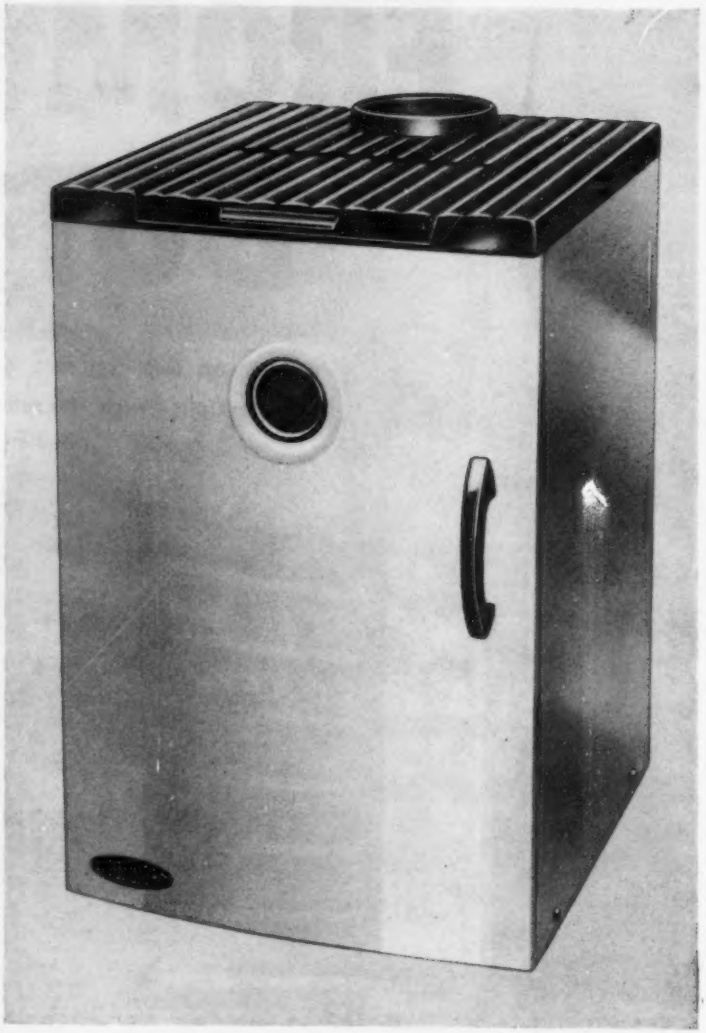
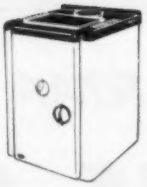


The choice was a Glow-Worm Junior de Luxe, capable of serving 30 square feet of radiation in addition to a 25 gallon hot water cylinder. The Junior de Luxe is thermostatically controlled, styled in the modern manner and available in white, cream, blue or green. It is completely dust-free even when riddling or dumping, and the robust, generous ashpan is big enough to hold all the day's ash. Clean, convected air from the grilles at the rear keep the kitchen warm. A really de luxe boiler with a de luxe look for only **£27.4.0.**, with **24/-** extra for a thermometer, if required.



ESTATE. A solid fuel, non-thermostatic boiler for hot water and a little background heating. In white, cream blue or green.
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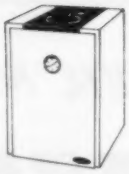

MINOR. A brand new, non-thermostatic solid fuel boiler suitable for a 25 to 40 gallon cylinder. In white, cream.
Blue or green extra.
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MAJOR. A new solid fuel, hopper-fed, thermostatically controlled boiler for ample hot water and 100 sq. ft. of radiators. Choice of colours.
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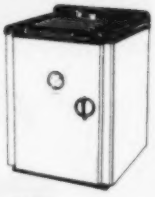

TWO ARISTOCRATS
Solid fuel, thermostatic, for hot water supply plus a radiator or two. The **JUNIOR** costs **£24** and **MK III, £30.** Choice of colours.

GLOW-WORM

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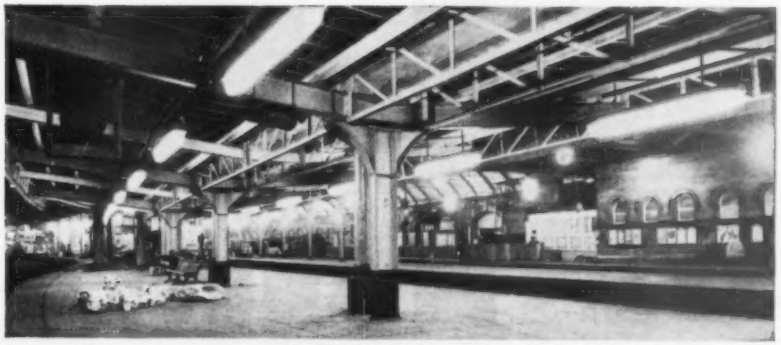
Signs made from 'Perspex' acrylic sheet for Agip Supercortemaggiore.

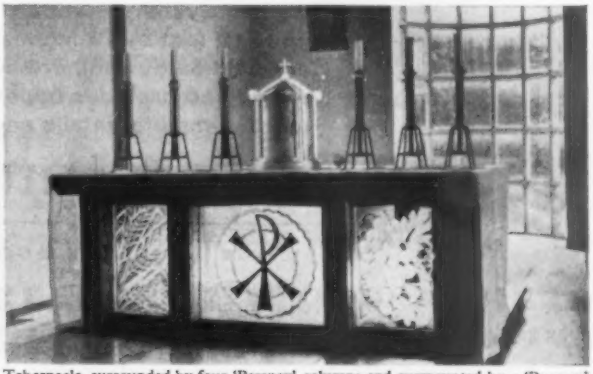


Dust and weather-proof 'Trilite' and 'Newlite' lighting fittings made from 'Perspex' by Ionlite Ltd. Scrubs Lane, London, N.W.10. The fittings shown are in use at Newcastle Central Station.

'Perspex' domelights made by Orbex Ltd., Failsworth, Manchester, in use at the Eastwood High School for Girls. Architect: P. F. Burridge, F.R.I.B.A., Borough Architect, County Borough of Southend-on-Sea.

Single-sided display stand backed with opal 'Perspex and illuminated with six 40-watt fluorescent tubes. Used in the china and glass shop of Horsham Galleries, 10 Middle Street, Horsham, Sussex.

'Bink' combined kitchen sink and bath unit in which the sink and bath are both made from gay, colourful 'Perspex' acrylic sheet. Sole manufacturers: Bink Unit Developments Limited, Oldham, Lancashire, owners of 'Bink' trade mark.



Tabernacle, surrounded by four 'Perspex' columns and surmounted by a 'Perspex' cross, on the Altar, which is faced with three panels carved in 'Perspex', at St. Peter's Dominican Priory Church, Hinckley, Leicestershire. Designer: A. Fleischmann.

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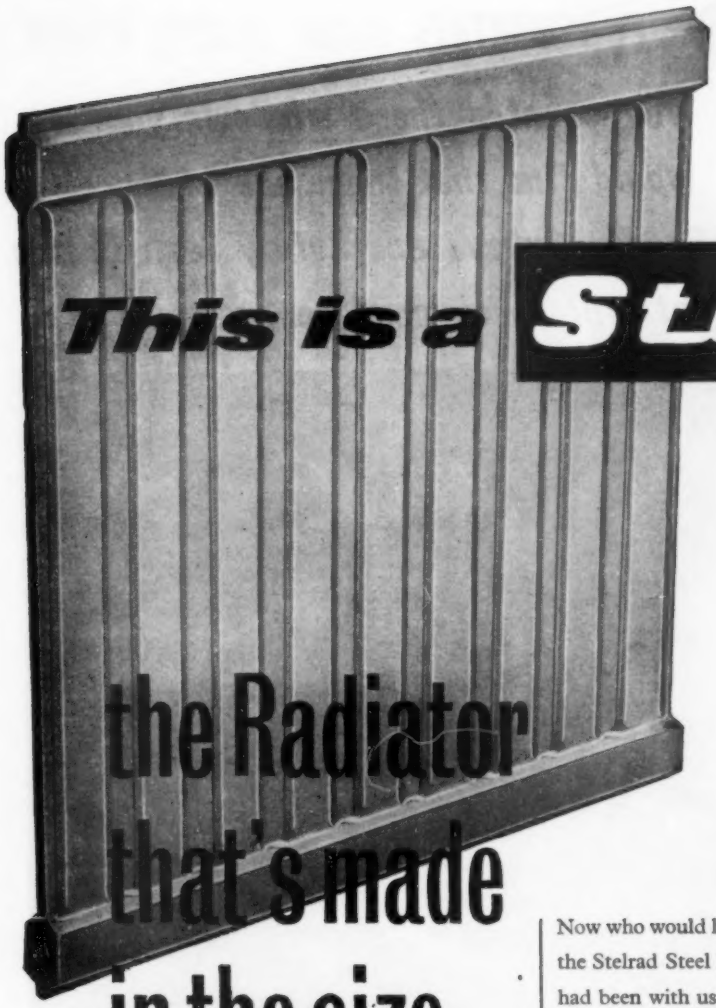

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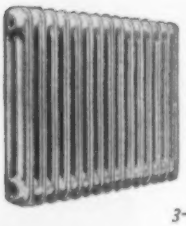
the Radiator that's made in the size you want, and in the shape your client likes

Double Wall

Angle-Wall



3-Column

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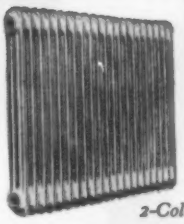
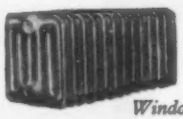


2-Column



Window seat type

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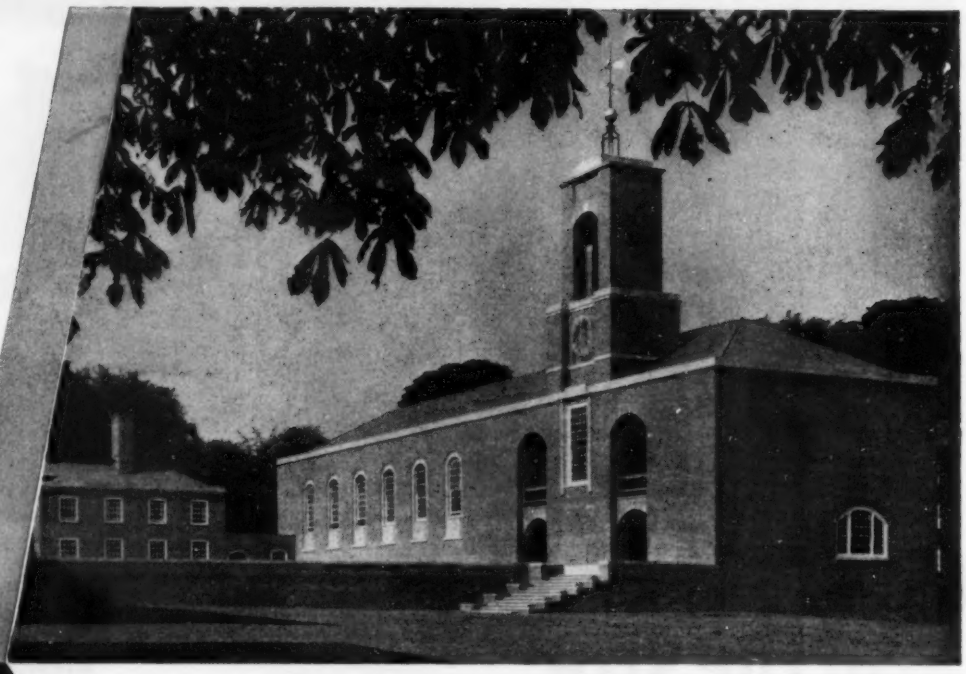
if you counted these windows you would find that there are 1186 Rhodes Pulleys and Safety Sash Chains that will never need renewal



Architects:
Horace Farquharson,
Donald H. McMorran, A.R.A.,
George Whitby, M.B.E.

Contractors:
John Laing & Son Ltd.
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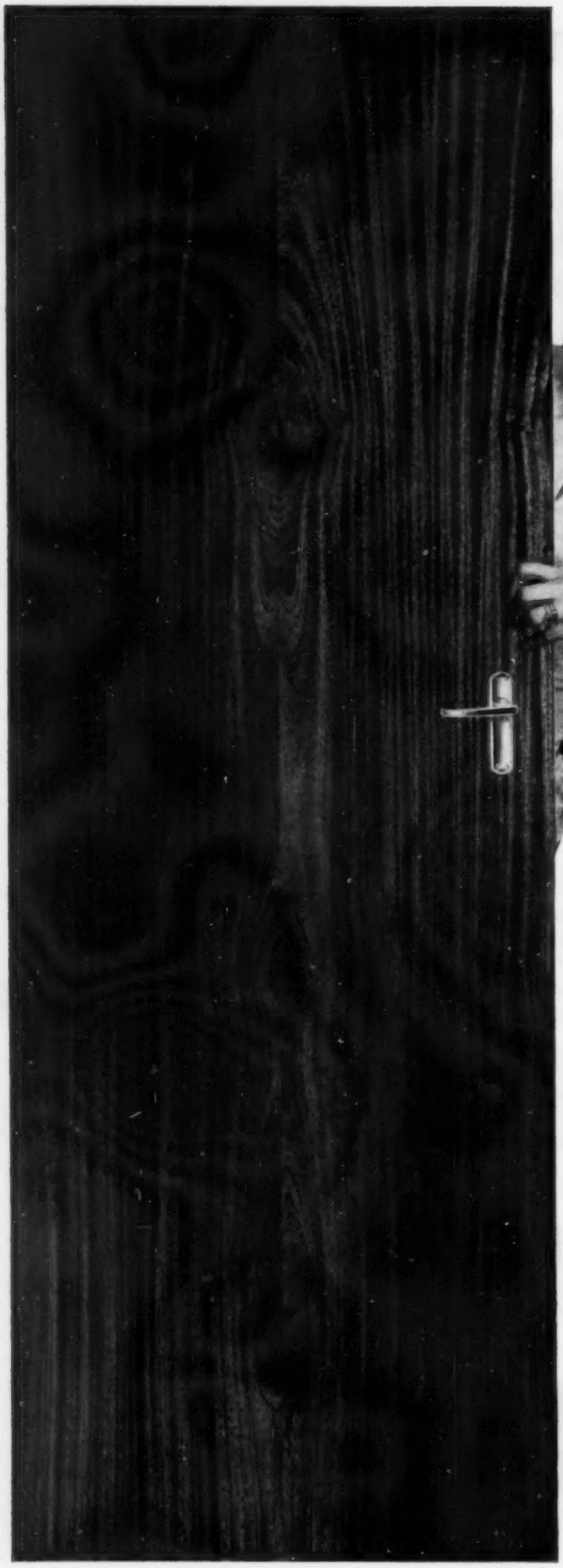

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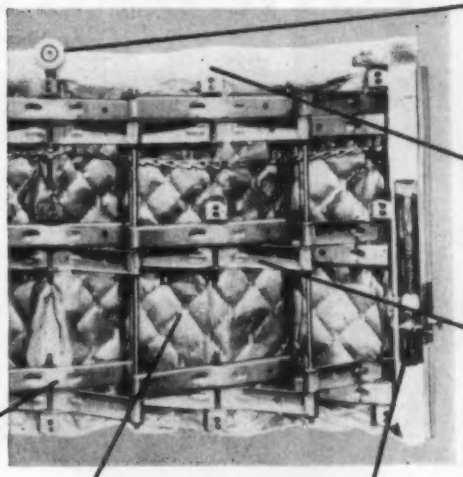

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NOTE THESE SPECIAL FEATURES

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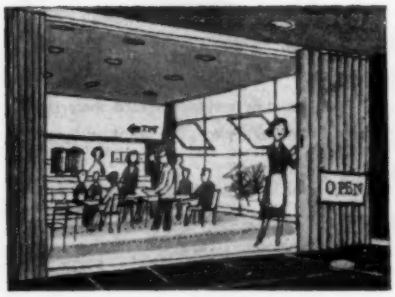

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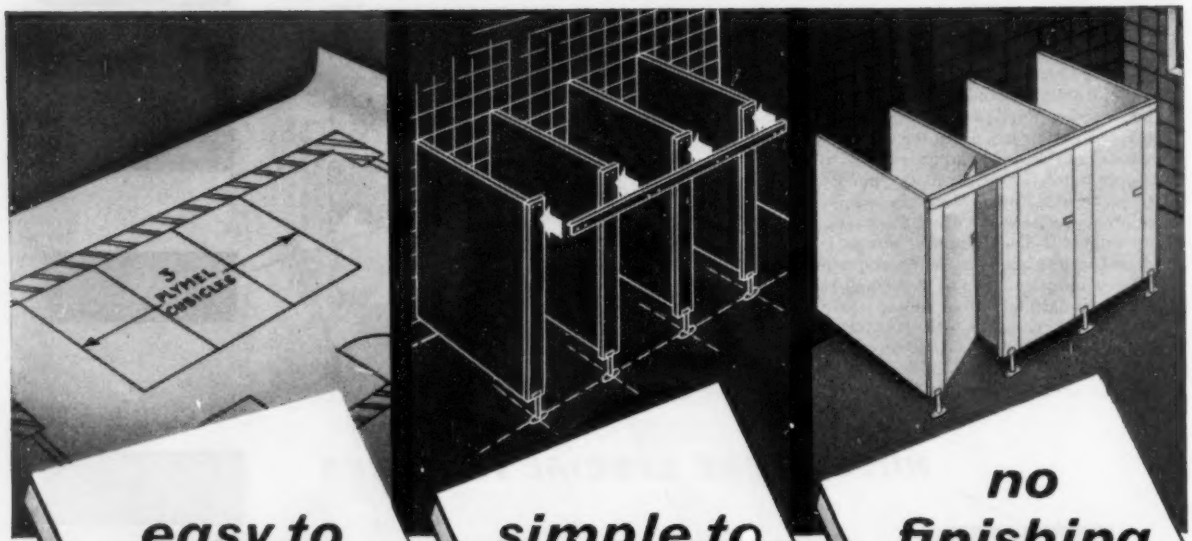
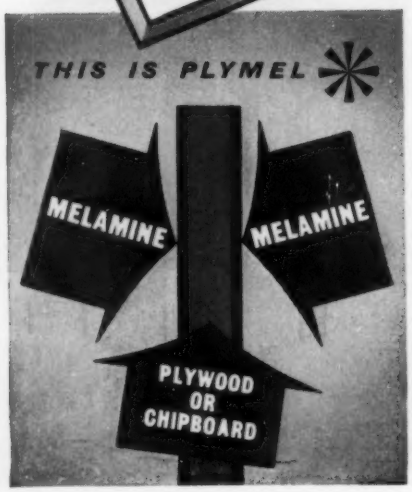


easy to specify

simple to erect

no finishing needed



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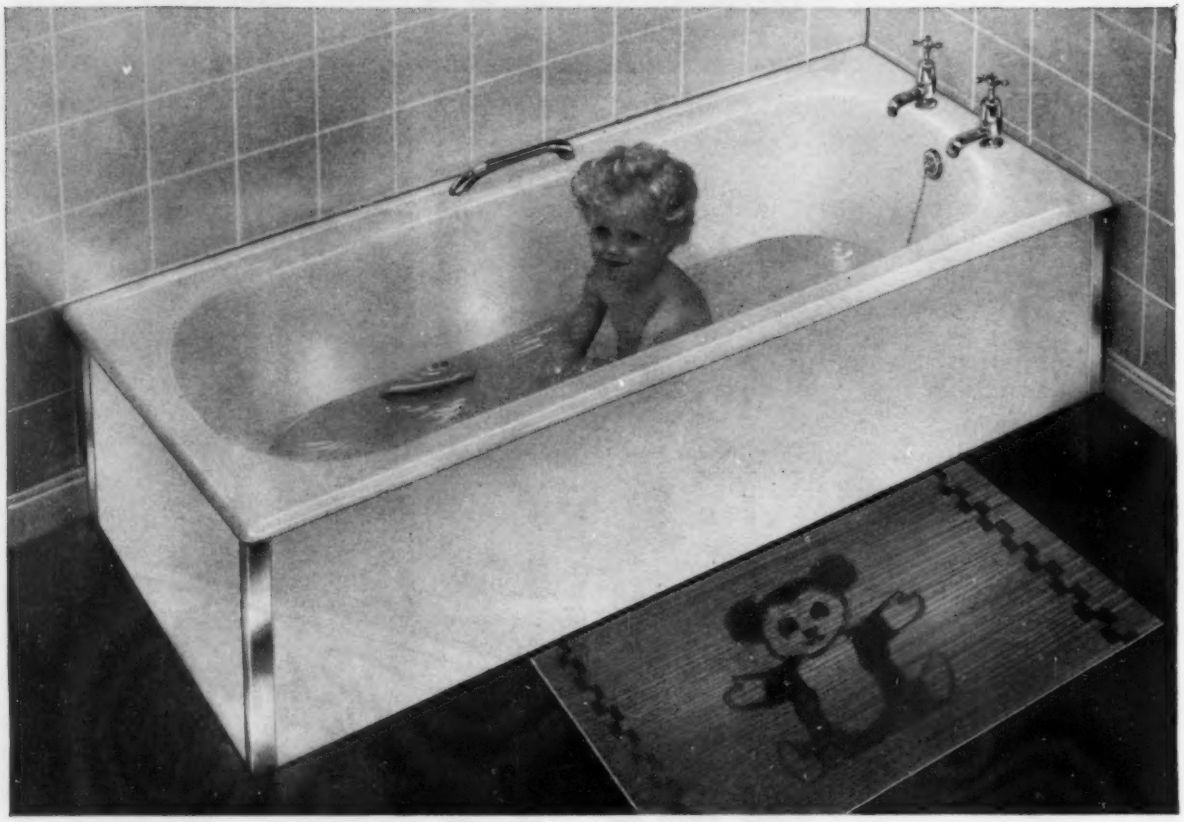

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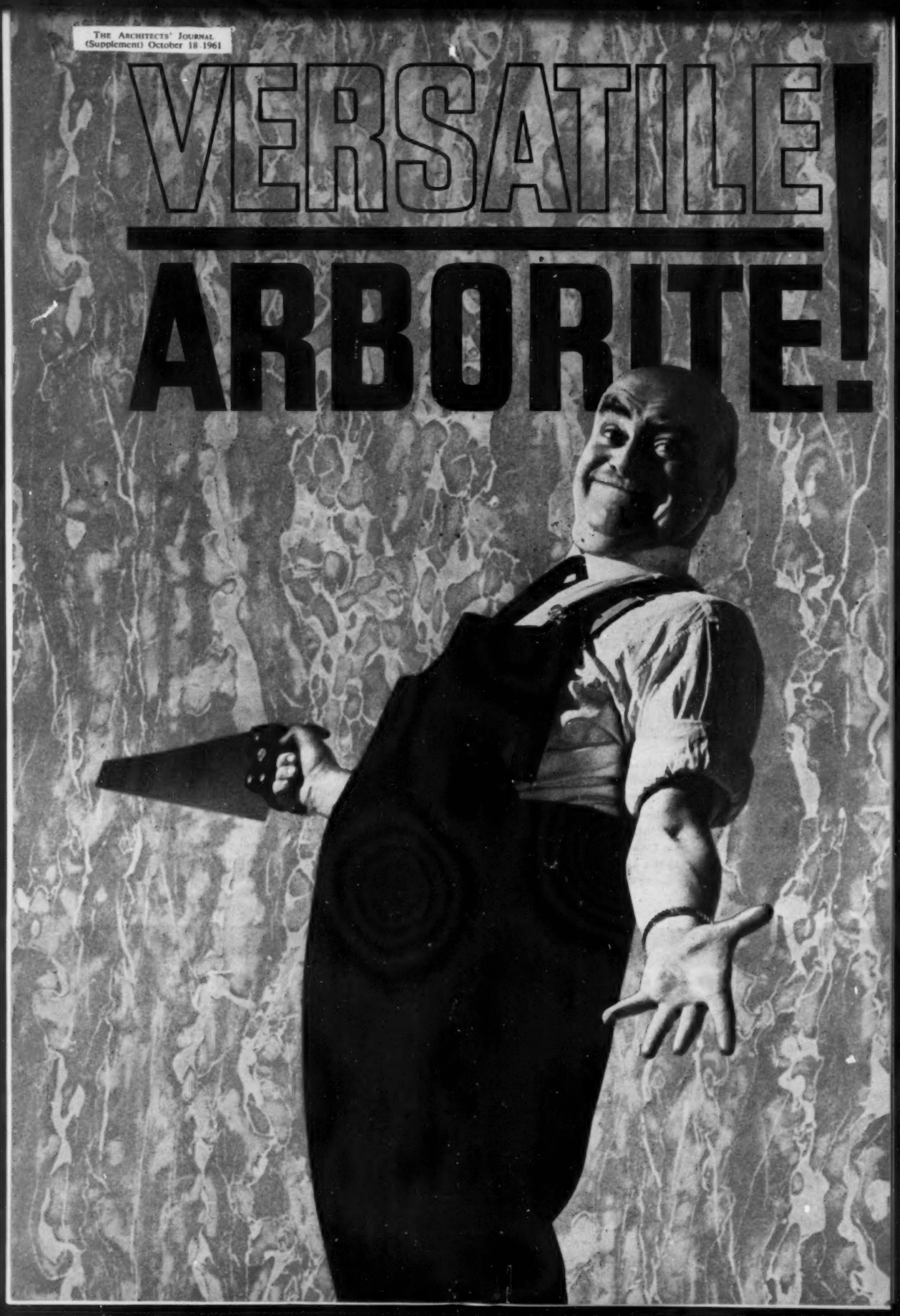

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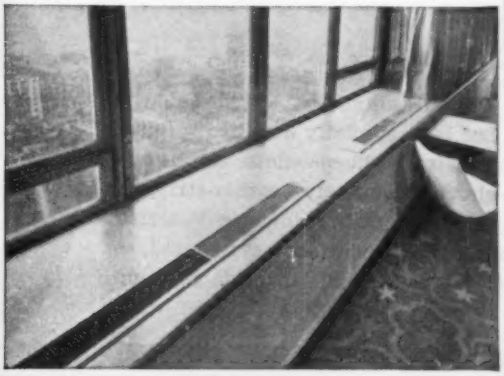

A cafeteria in the Sun Life Building in Montreal demonstrates the versatility of ARBORITE for wall panelling and table tops.

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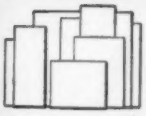

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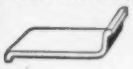

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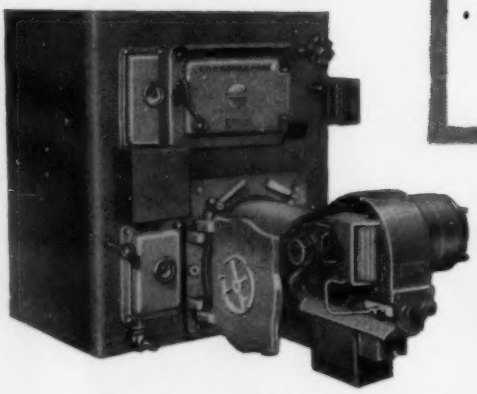

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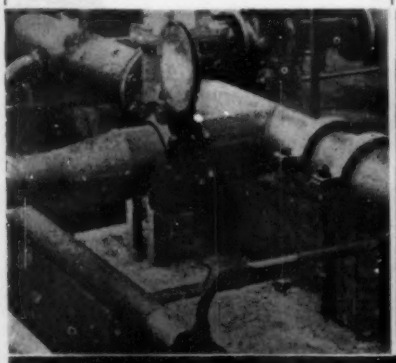
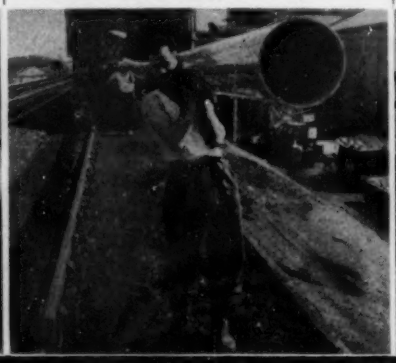
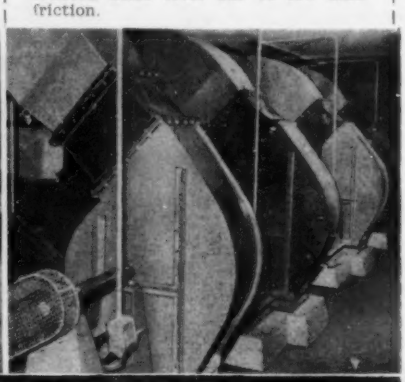
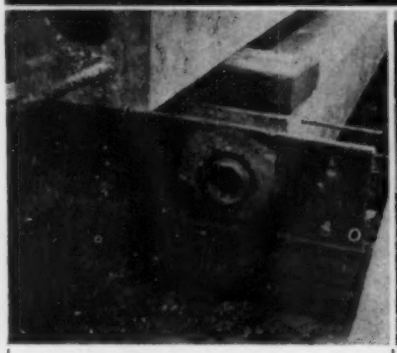
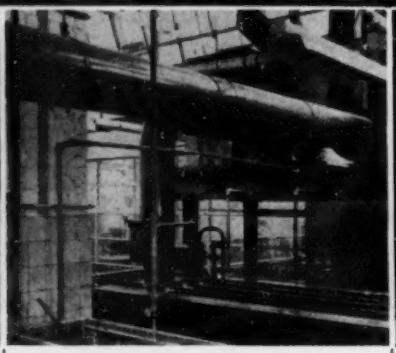






PLASTICS IN BUILDING





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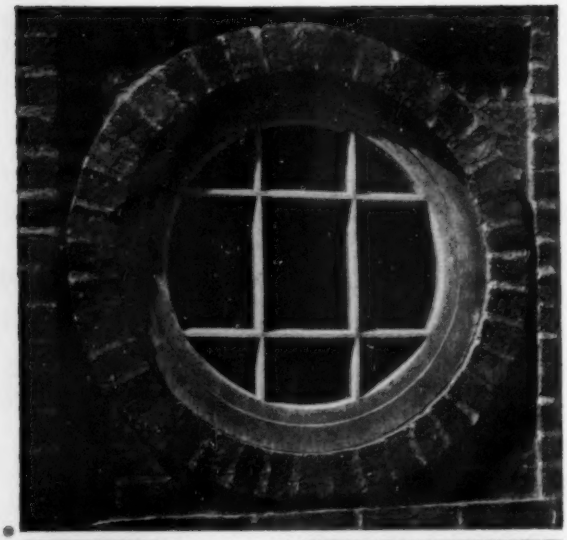

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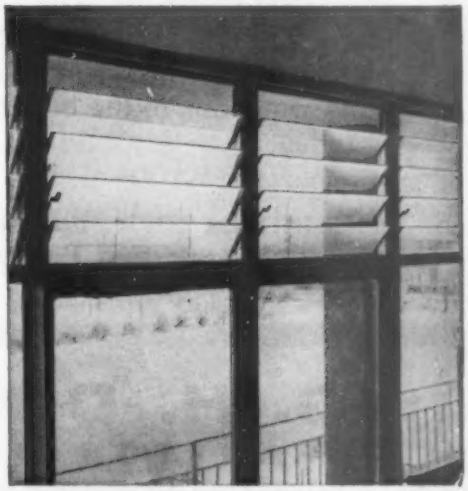

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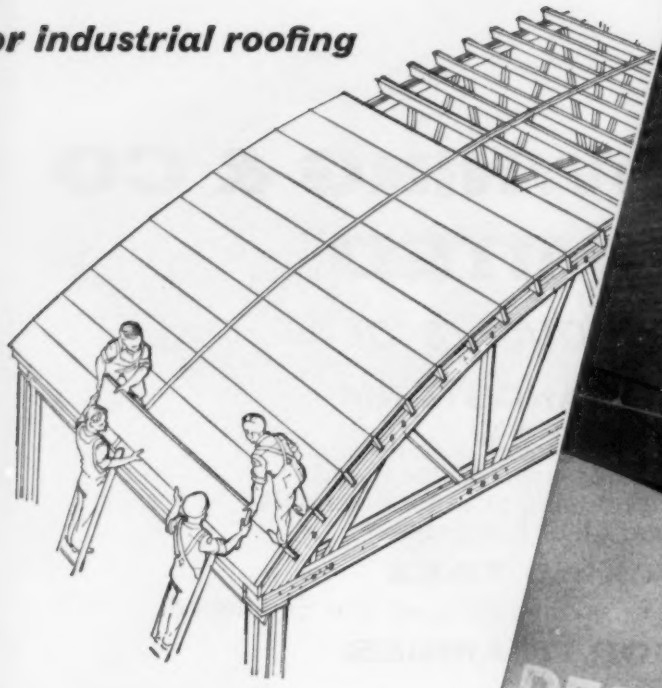

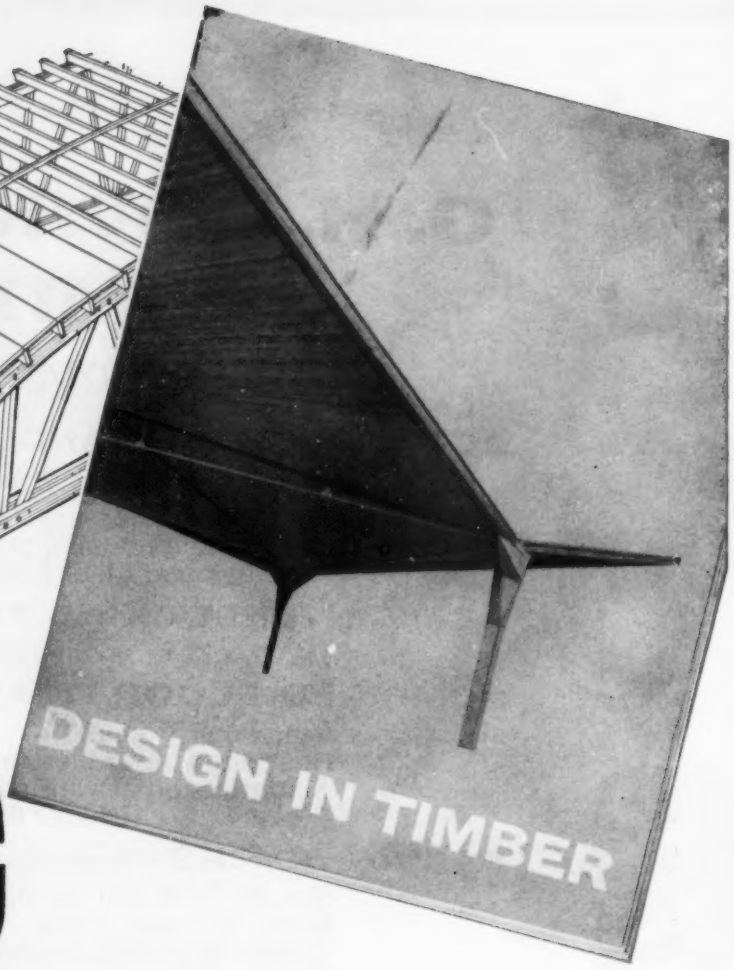

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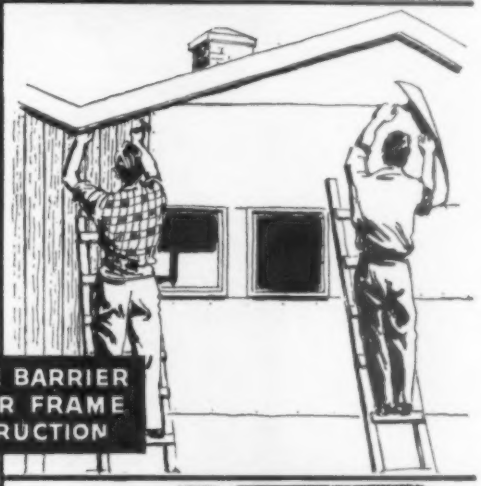

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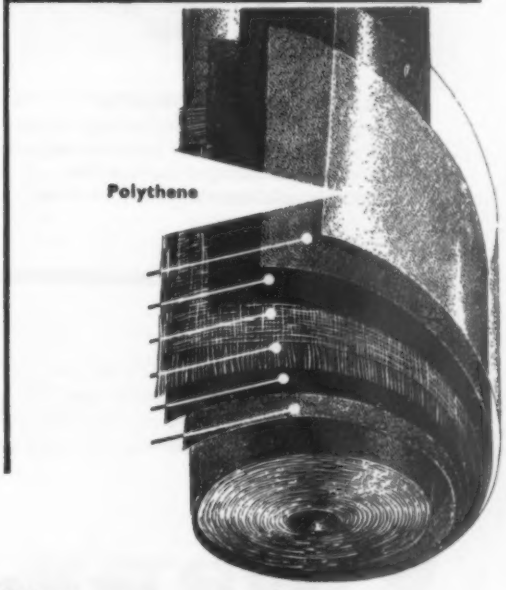

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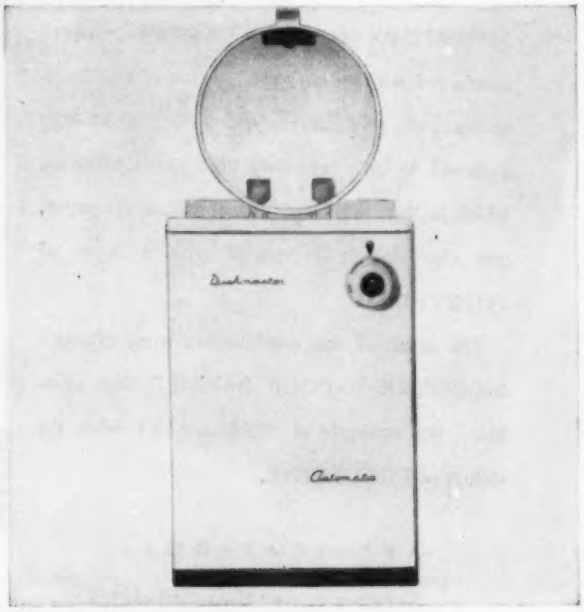

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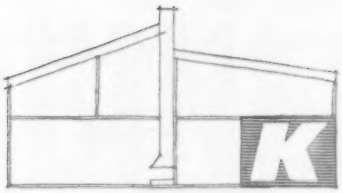

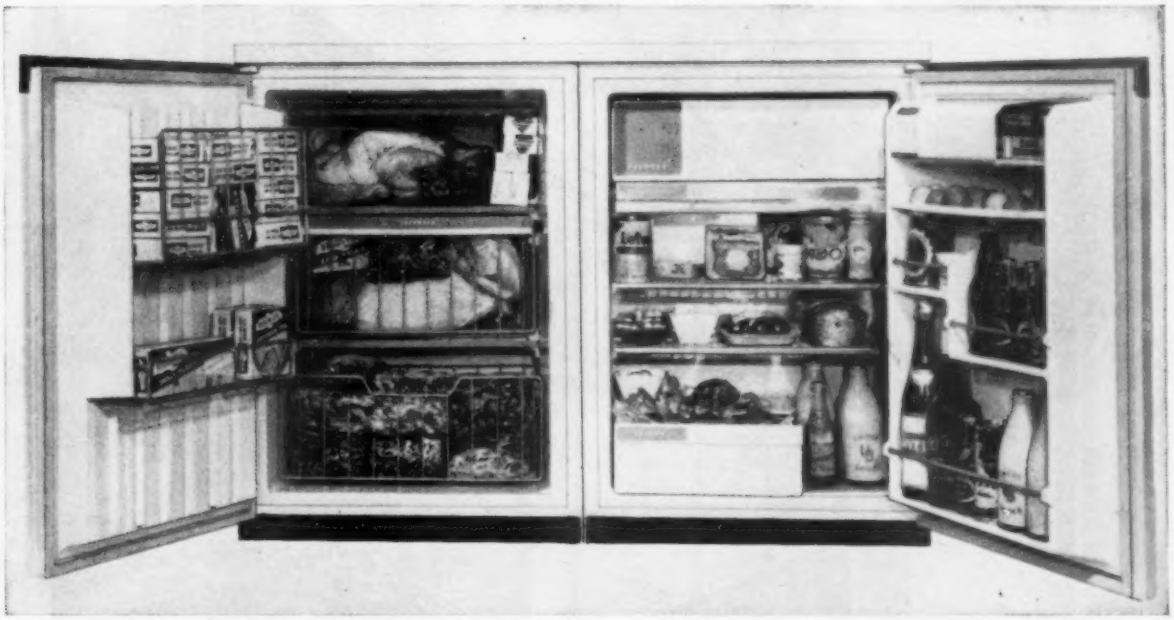

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SEE THE NEW FILON SHEET AT THE BUILDING EXHIBITION, NOVEMBER 15th - 29th AT OLYMPIA, Stand 959/960.

— AND THIS IS HOW WE TEST ITS REMARKABLE STRENGTH AND RESILIENCE

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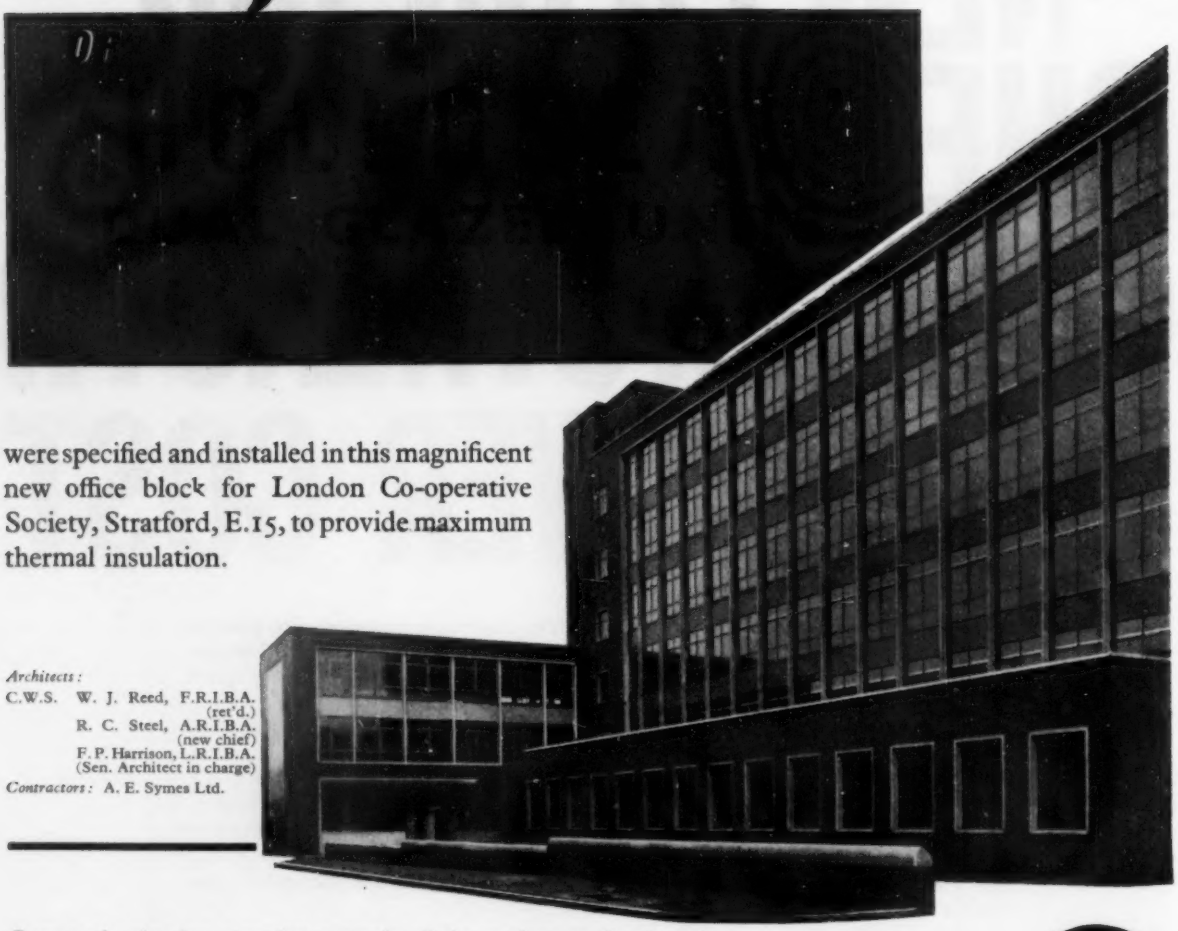

were specified and installed in this magnificent new office block for London Co-operative Society, Stratford, E.15, to provide maximum thermal insulation.

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Contractors: A. E. Symes Ltd.

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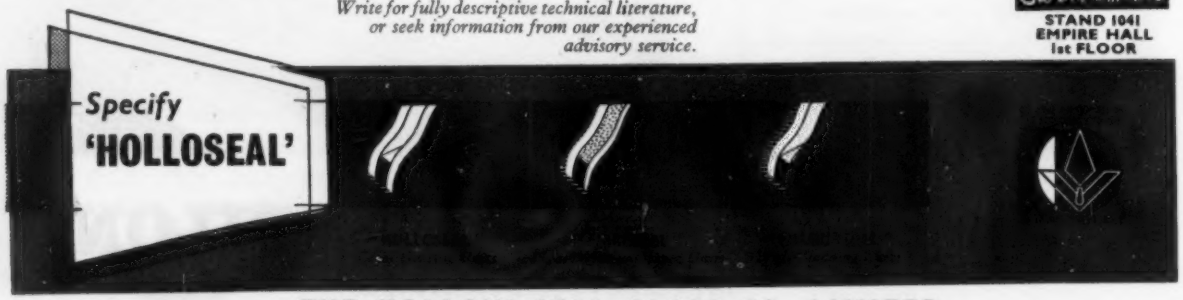

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2 The photograph shows the neat returns to the reveals, typical of Thermalite construction. No special Corners or Closers are necessary; Thermalite Blocks are readily and accurately sawn. The 3″ thickness of the inner leaf can clearly be seen.

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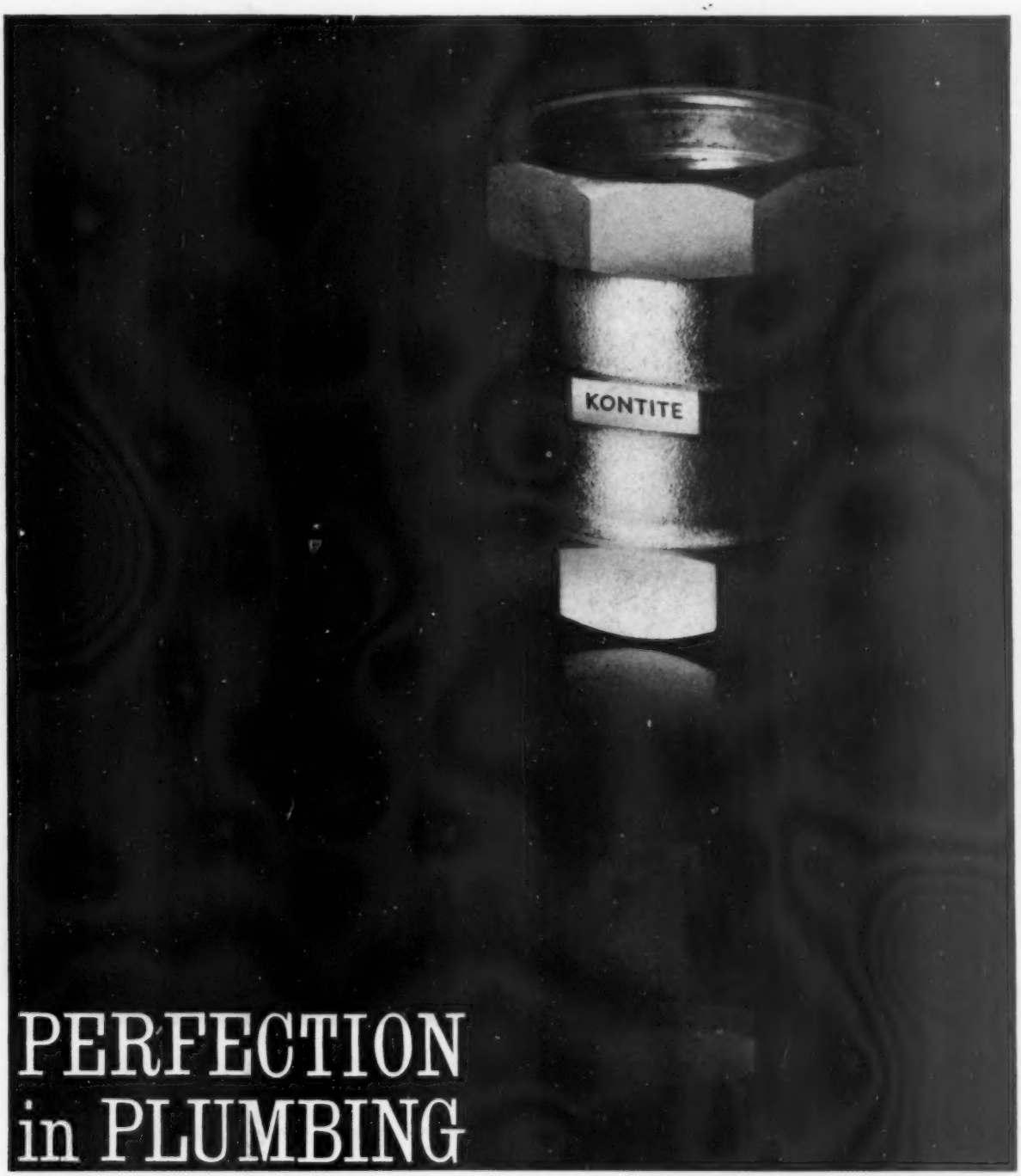

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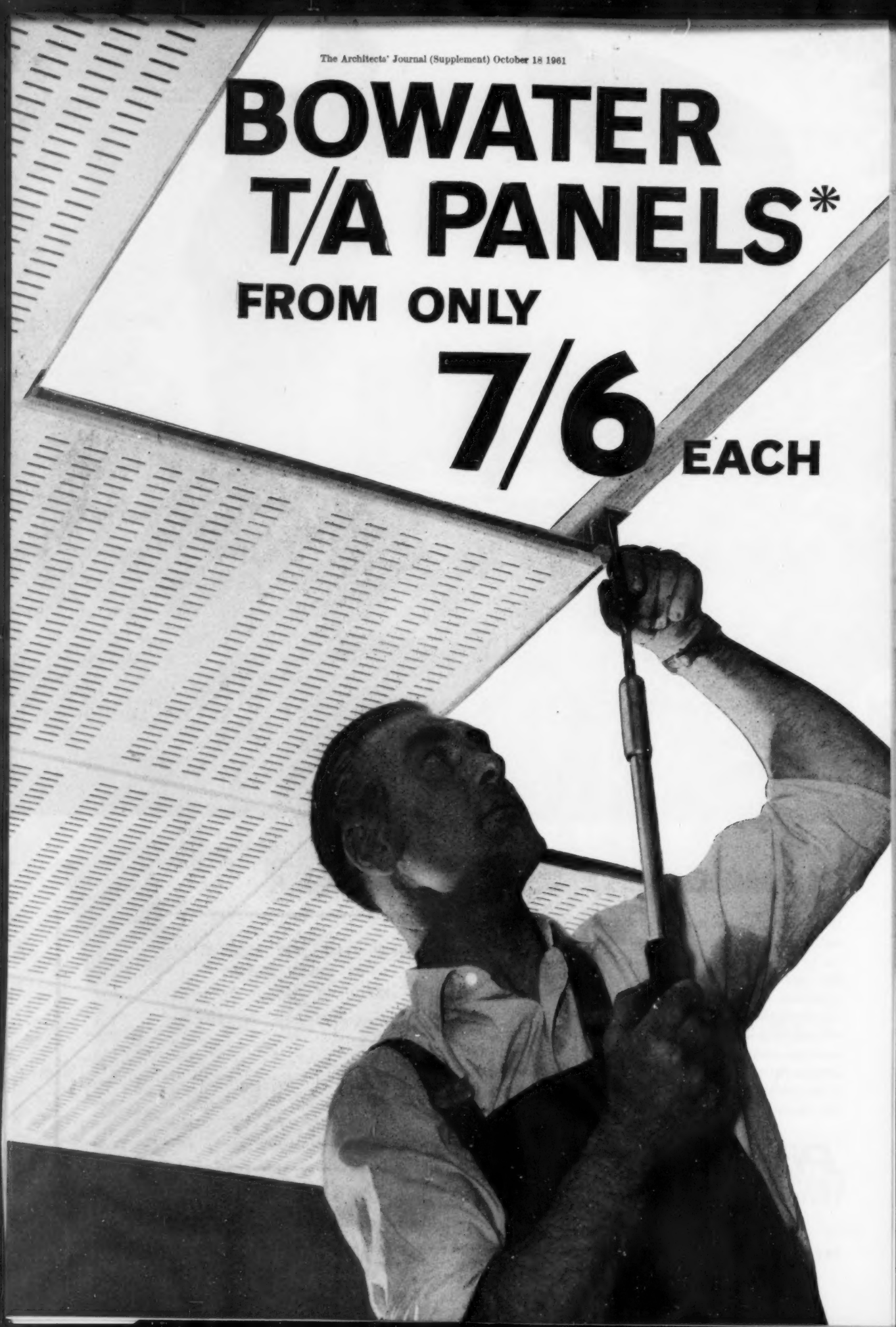

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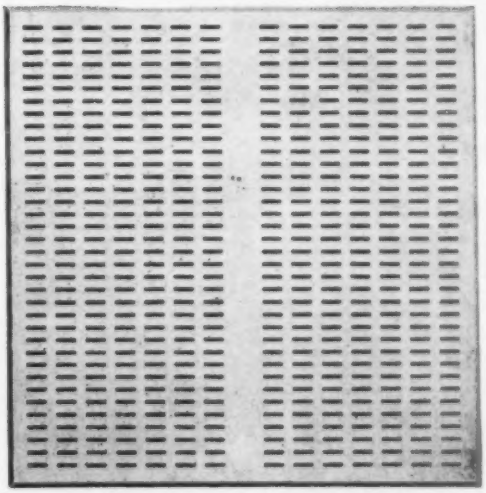
NEW SLOTTED T/A PANELS*



Slotted T/A panels are available from 8/- each. The illustration on the left shows them being fixed with aluminium alloy concealed fixing clips. This method allows space for services to be installed above the panels.

Pre-decorated at no extra cost

Panels are supplied emulsion painted to any colour in the B.S. colour range, and can be permutated with a wide choice of finishes: smooth or leathergrained hardboard, either perforated or in the new slotted version.

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Send for the new "Quick Guide to Bowater Module Ceilings." It tells you a lot more about the T/A panel—and it deals with our Dry Construction panels and our brand-new Versa-tile too.

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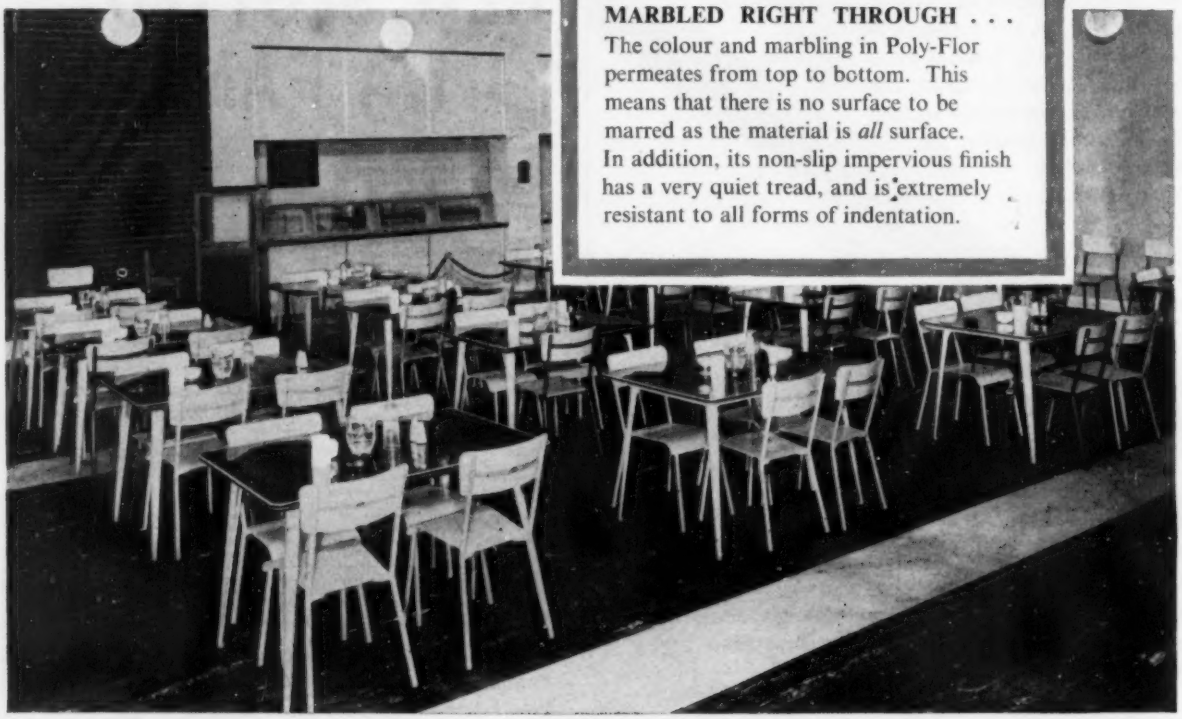
The colour and marbling in Poly-Flor permeates from top to bottom. This means that there is no surface to be marred as the material is *all* surface. In addition, its non-slip impervious finish has a very quiet tread, and is extremely resistant to all forms of indentation.



Architects, Hospital Management Committees and anyone interested is invited to get in touch with our Contracts Manager, Leslie Jennings

POLY-FLOR P.V.C. FLOOR TILES

JAMES HALSTEAD LIMITED,
P.O. BOX 3, CROW OAK WORKS,
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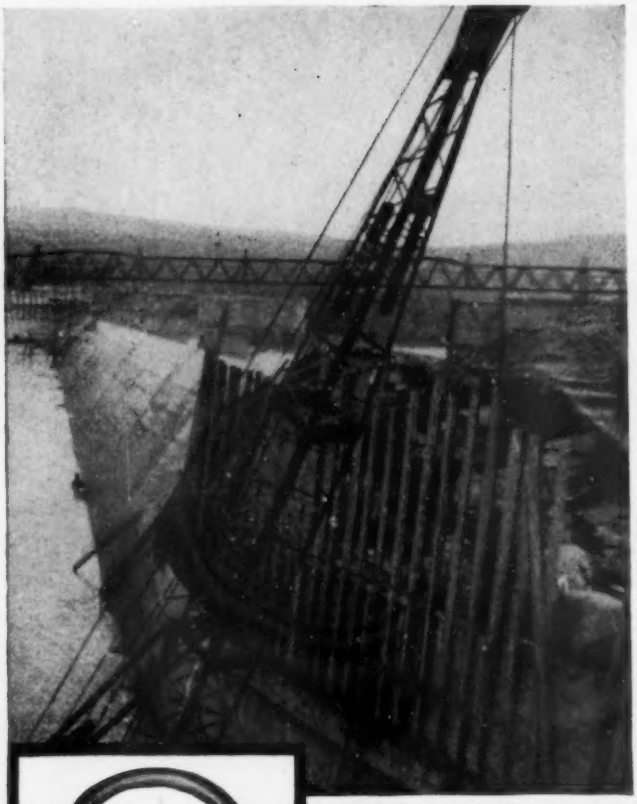

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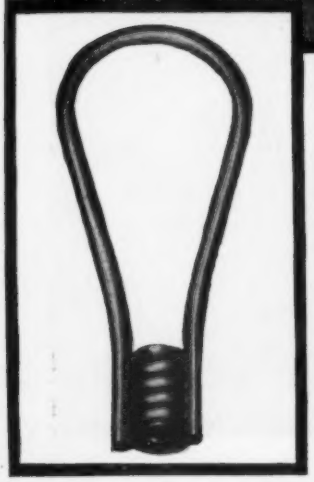
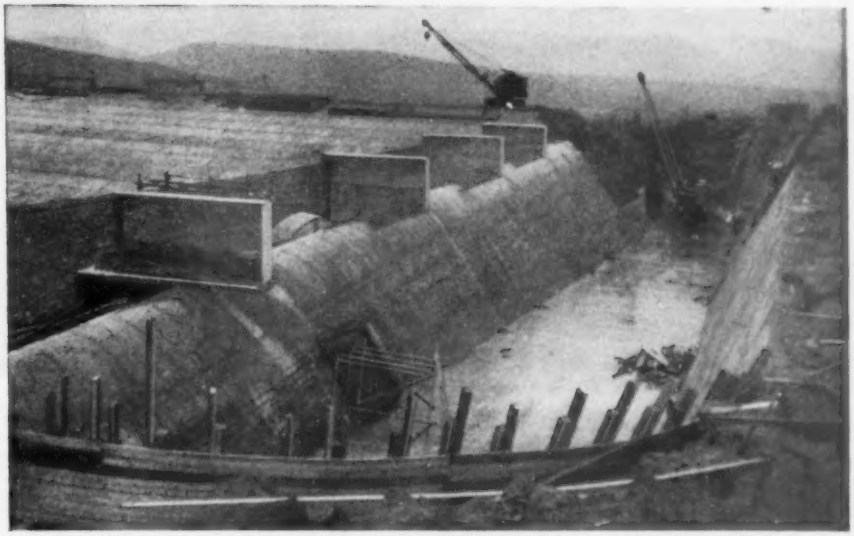


The illustrations show an Overflow Weir Channel under construction. Rawloops were used to form the anchor for supporting the studs, the shuttering being placed progressively to obtain the required contour.



We are indebted to the Daer Water Board, Elvanfoot, Lanarks for their kind permission to use these photographs and to Messrs. Burnie, Deacon and Gourlay, Consulting Engineers for their valued co-operation.

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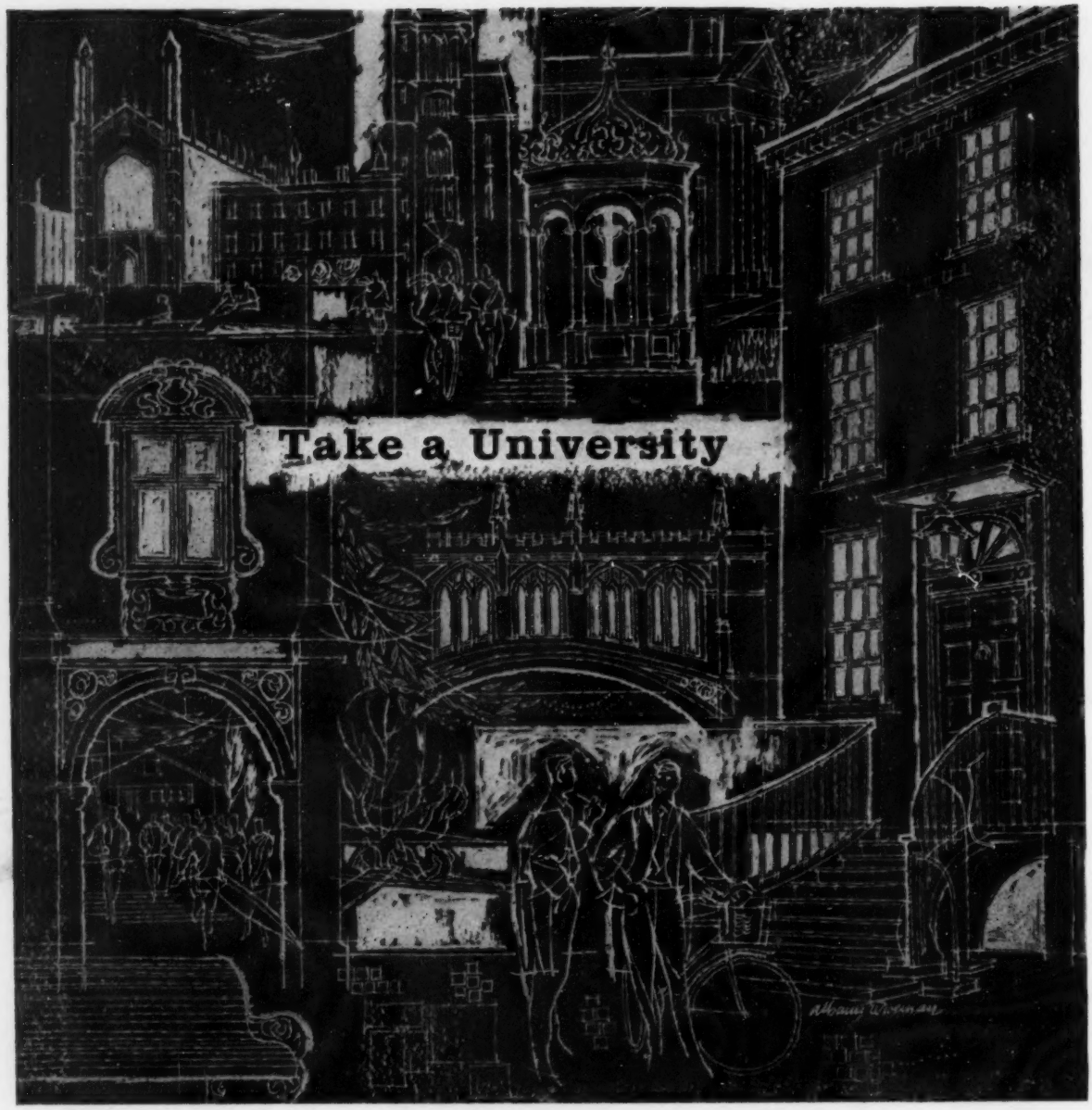

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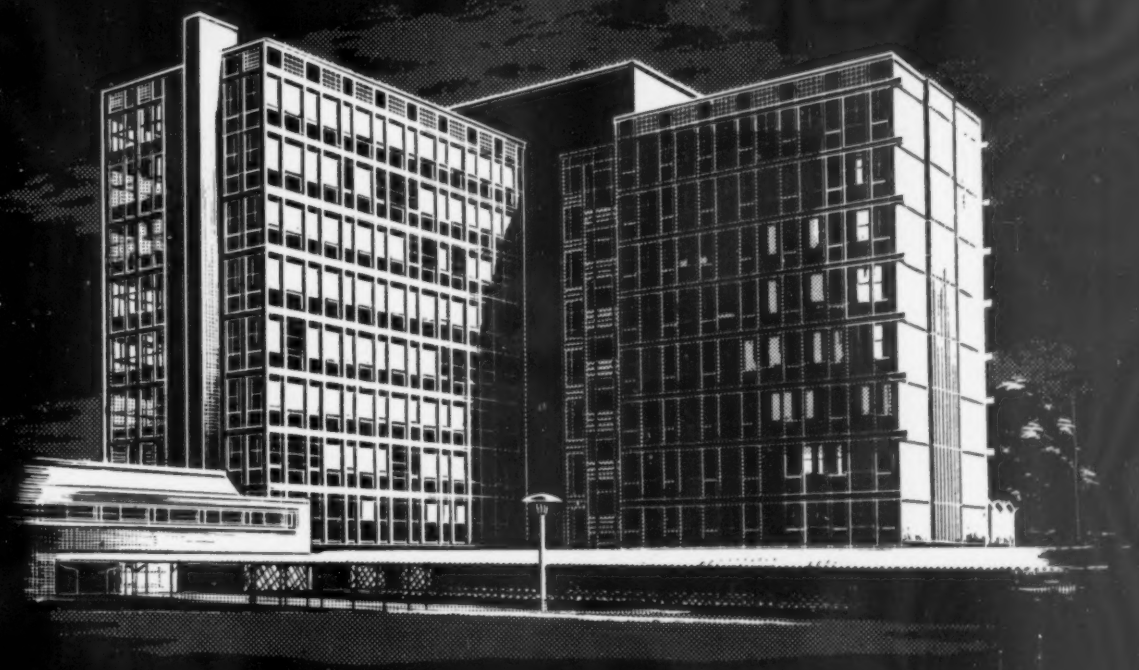

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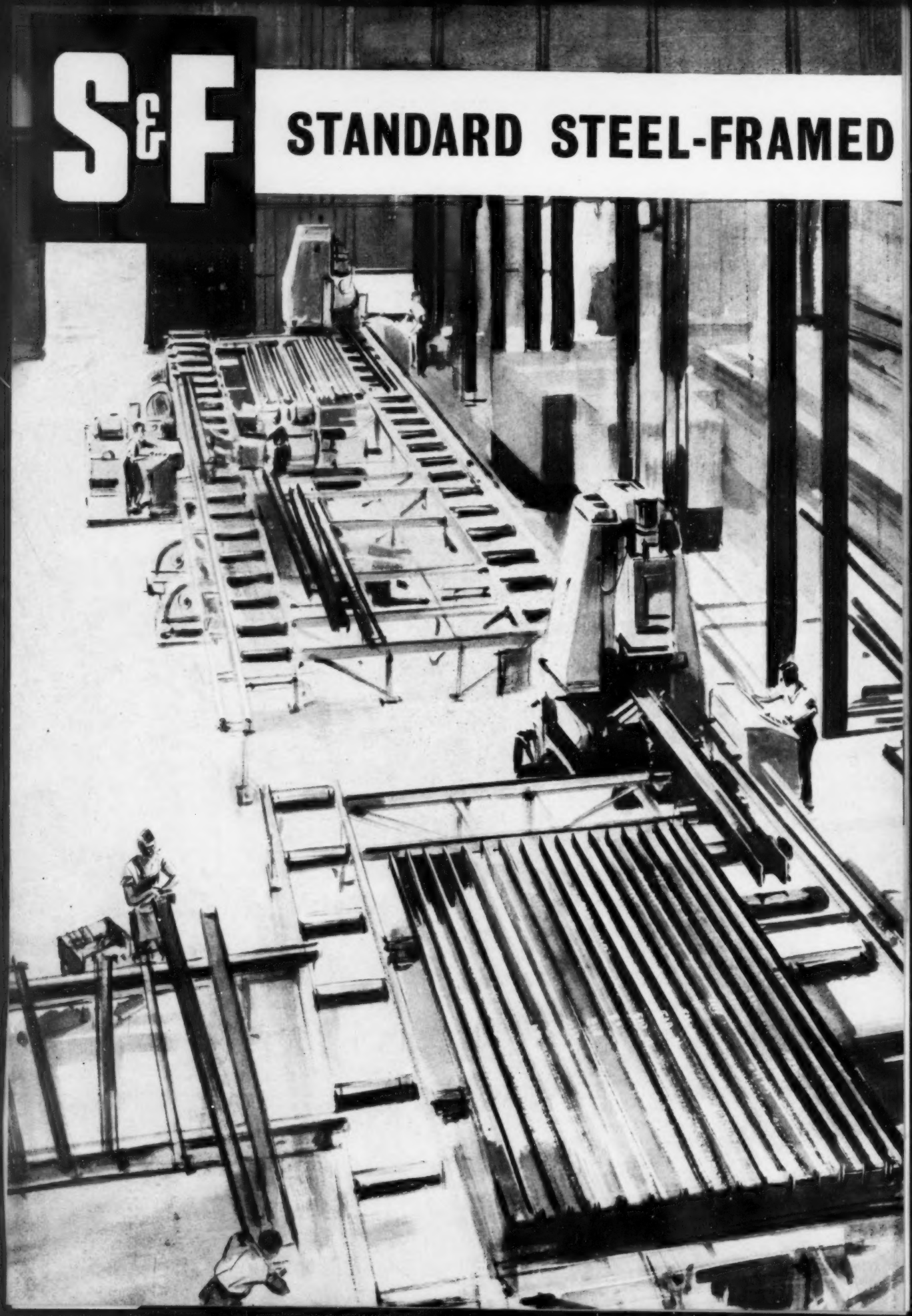

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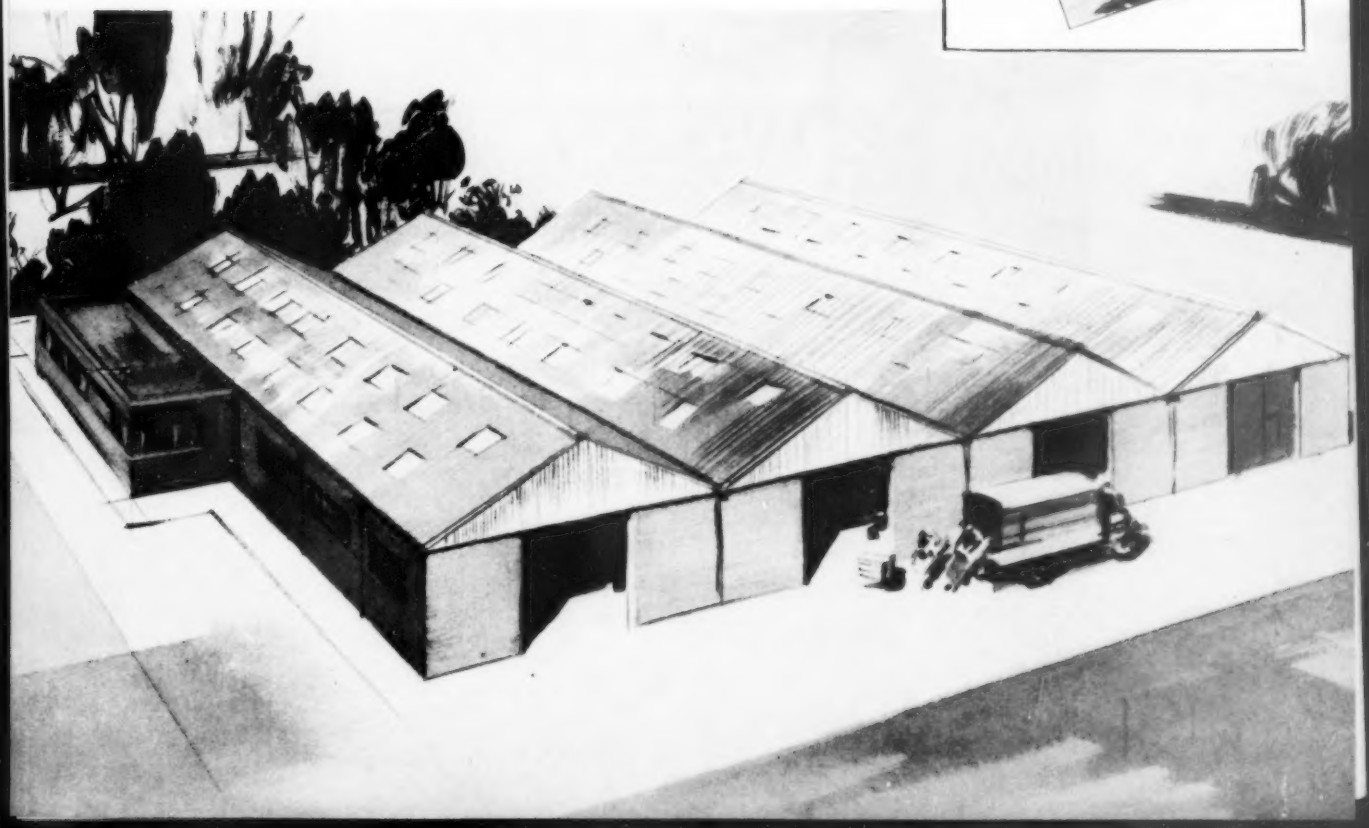

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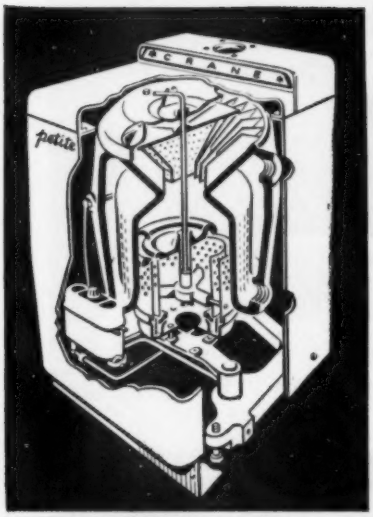

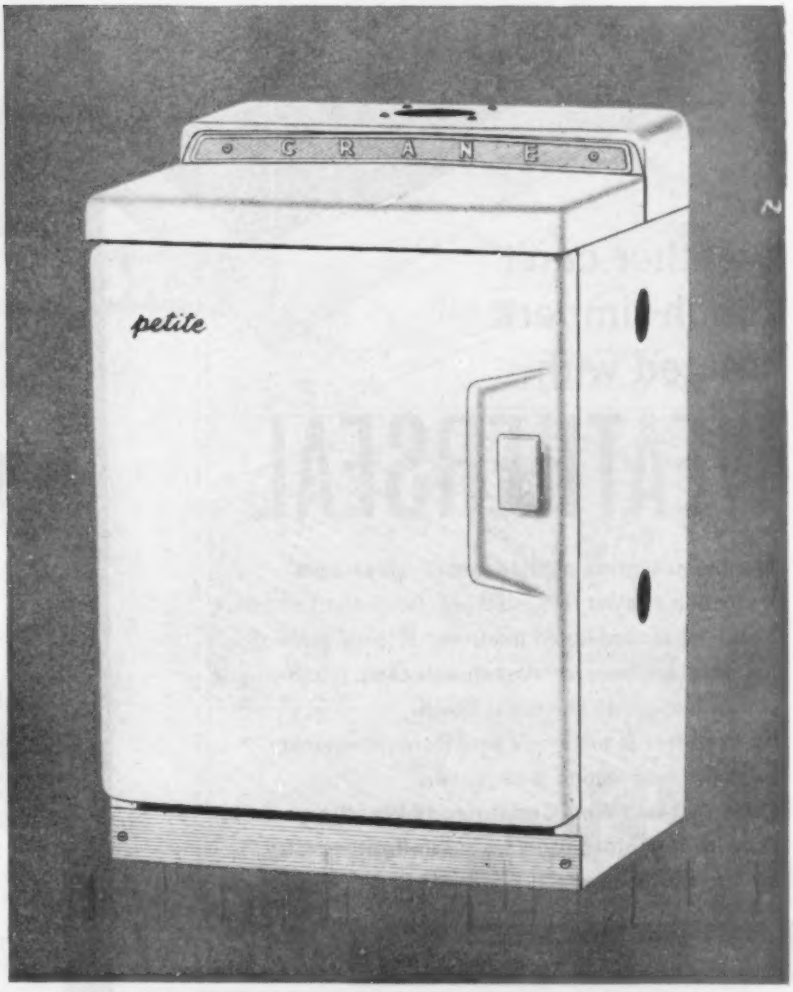

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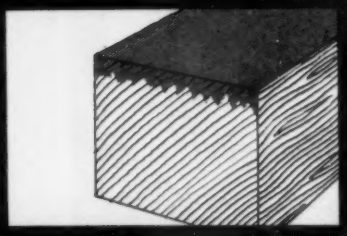

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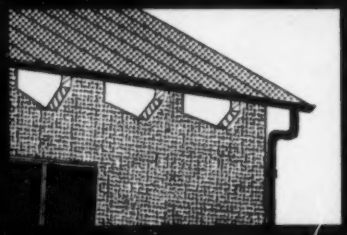

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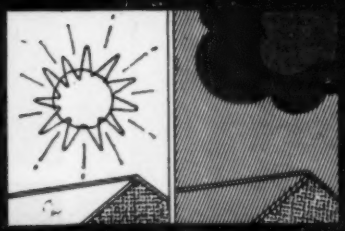

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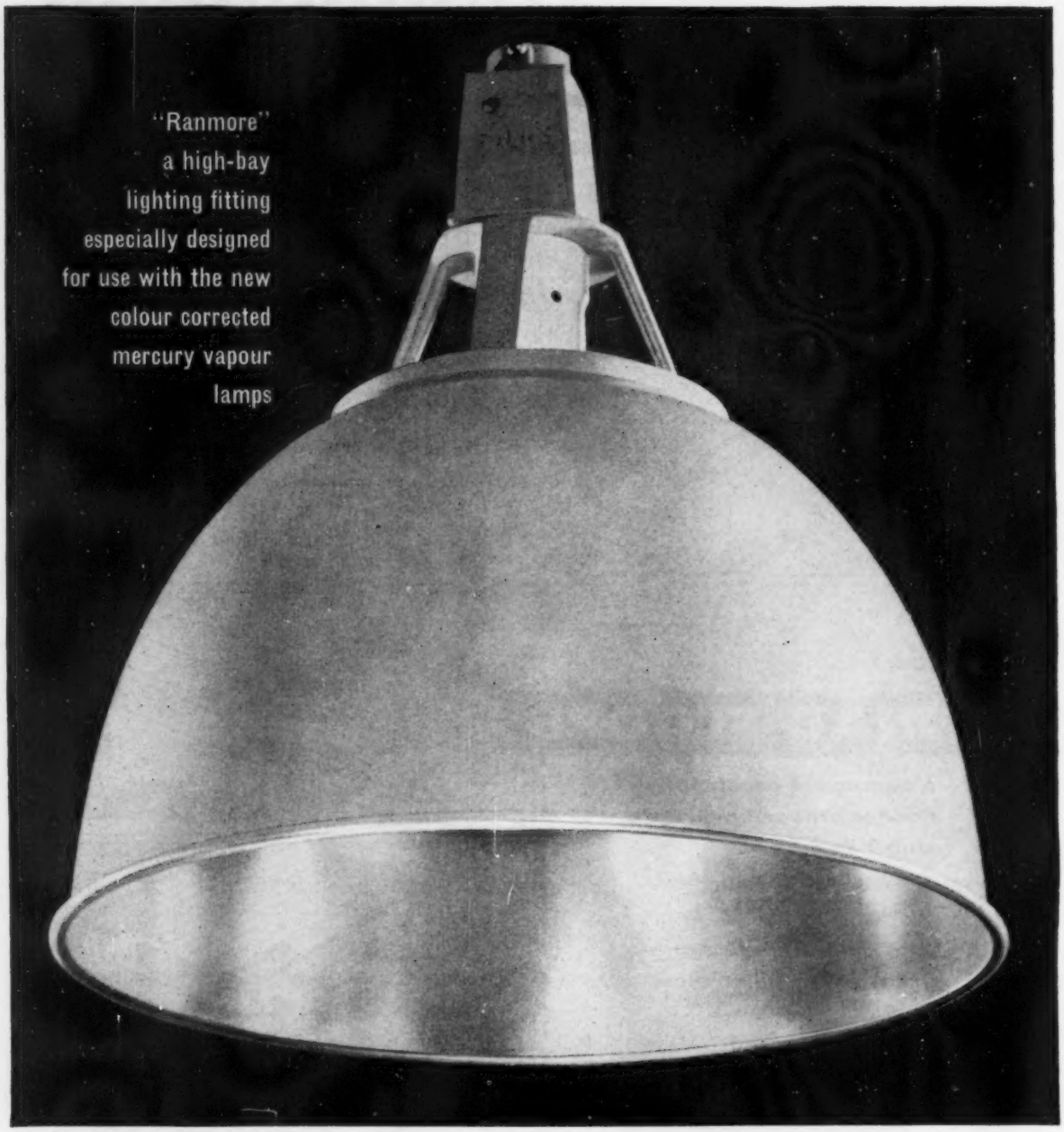

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AP 116

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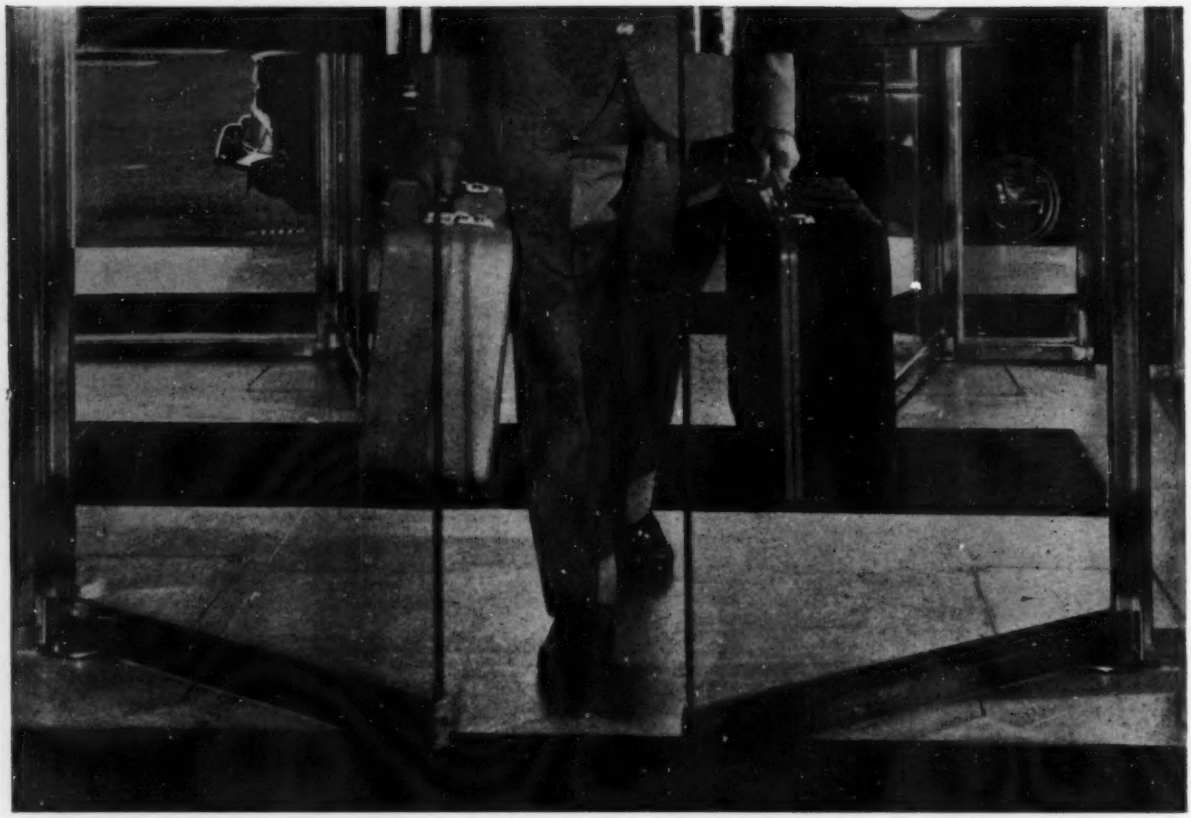

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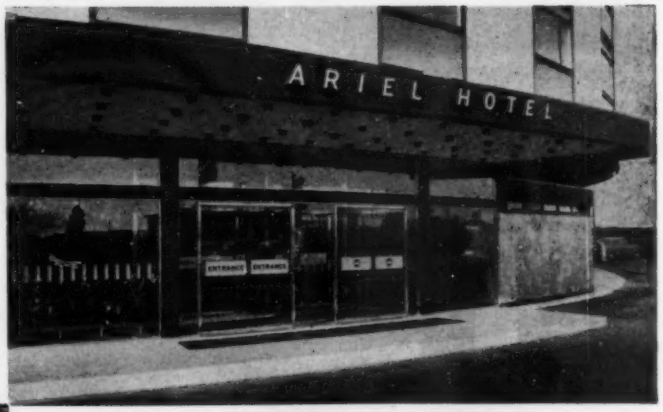
When the Ariel Hotel, opposite London Airport, was designed only the best was good enough. That is why automatic doors were specified for the main entrance. Aesthetically appealing, the doors are also immensely practical in the busy life of an hotel where saving of time is an important factor. Like the Ariel Hotel, choose wisely — choose Tormax Automatic Door Control.

Installation by Fredk. Sage & Co. Ltd.



TORMAX **Automatic Door Control**

NEWMANS **Sponsored**

AUTOMATIC DOORS LIMITED · 1 FITZROY STREET · LONDON · W.1. Tel: LAN 1456-7

'PHORPRES' HOLLOW CLAY BLOCKS —AND THE PRE-CAST HOLLOW TILE BEAM FLOOR

REMEMBER POPPY DAY

THE ADVANTAGES

STRENGTH. The Hollow Tile Beam Floor possesses great strength combined with light self-weight. The good bonding between the concrete and the grooved blocks ensures that the stresses from concentrated loads are well spread over the structure.

ADAPTABILITY. The Pre-Cast Hollow Tile Beam Floor can be designed for wide spans without intermediate supports. Flat roofs can be constructed in the same manner as floors and the method is particularly suited to the construction of cantilevered balconies.

SERVICES. Conduit for services is buried in the structural concrete screed.

FIRE RESISTANCE. The Hollow Tile Beam Floor using 'Phorpres' Hollow Clay Units gives excellent resistance against fire.

The Pre-cast Hollow Tile Beam Floor

The Bondura system uses special 'Phorpres' Clay Blocks built into units of specified length and a standard width of 1' 4" on site. The units are built as walls, each 'wall' comprising three units with sand joints between them.

After a maturing period of fourteen days the units are taken from stack and placed on a trolley for convenient handling. The units are then hoisted with special hoisting gear to the required level.

The unit remains on the trolley until placed in position when the intermediate joints are filled with mortar.

After the services have been placed on the floor a structural concrete screed is laid.

We wish to thank Brick Flooring Constructions Limited, for their co-operation in supplying the illustrations for this advertisement. Brick Flooring Constructions Ltd., 1 Surbiton Crescent, Kingston-upon-Thames, Surrey.

A HOLLOW TILE BEAM FLOOR IS A QUALITY FLOOR

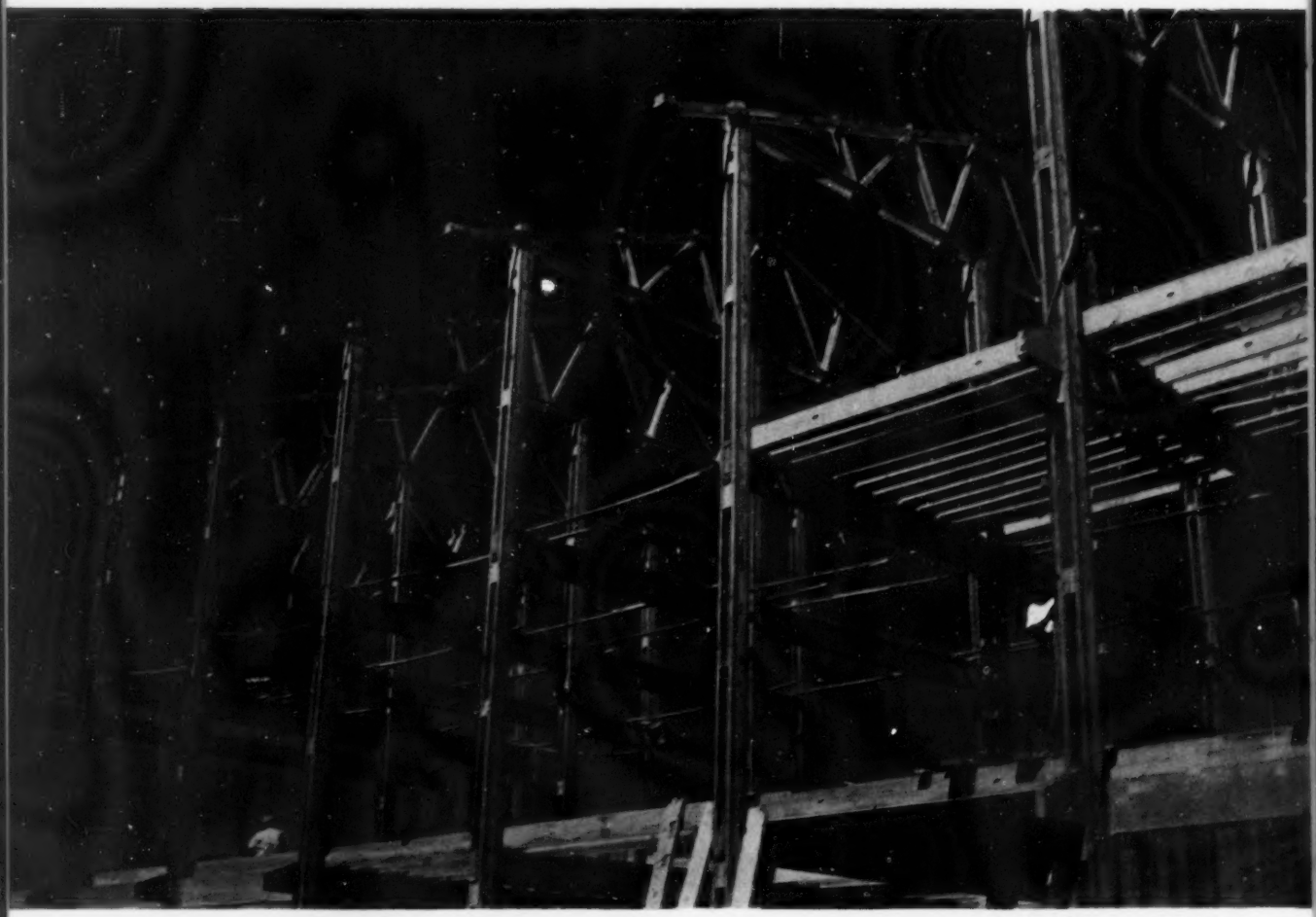
LONDON BRICK COMPANY LIMITED — in the service of the building industry

PHORPRES

Head Office: Africa House, Kingsway, London, W.C.2. Telephone: HOLborn 8282.
Midland District Office: Prudential Buildings, St. Philip's Place, Birmingham 3. Telephone: Central 4141
South-Western District Office: Royal London Buildings, Baldwin St., Bristol 1. Telephone: Bristol 23004/5.
Northern District Office: St. Paul's House, 20-22 St. Paul's St., Leeds. Telephone: Leeds 20771.

BY APPOINTMENT TO HER MAJESTY QUEEN ELIZABETH II BRICK MAKERS

SIMMS put the best CONSTRUCTIO



SIMMS C-DA block of Flats during erect

'Pyrolith' flameproofed timbe

Built-in fire fighting and termite protection in vast Aden barracks project

The many thousands of cu. ft. of timber in these buildings have automatic fire protection. 'Pyrolith' comes to life in the presence of fire by preventing the flame-spread which makes the difference between a small, controllable outbreak and a raging inferno. This effective, unobtrusive fire-fighter was implanted by vacuum/pressure impregnation, in some cases before gluing and in others, after gluing.

Termite- decay- and insect-proofing come as free extras with 'Pyrolith' treatment.

A storage building in Simms Timber construction nearing completion.

Two-storey office block

HICKSON'S

TIMBER IMPREGNATION CO. (G.B.) LTD.

Castleford, Yorkshire. Telephone: Castleford 3841
and 8, Buckingham Palace Gardens, London S.W.1.
Telephone: SLOane 0636

n a modern building project in Aden

ne of the 30 SIMMS C-DA blocks of Flats supplied to Air Ministry, Aden.

Photographs reproduced by kind permission of the Air Ministry and War Office.

in SIMMS C-DA multi-storey construction in timber

re-fabricated sections ready for shipment.

ome 3 storey living quarters.
Note the glued laminated timber columns.

SIMMS C-DA system of multi-storey timber construction comprises glued laminated columns, plybox floor beams with glued laminated chords. Flat roofs are carried on plybox beams, pitched roofs on connectored trusses. All structural timbers in the buildings illustrated are flame-proofed with 'Pyrolith' which includes protection against fungus and insect attack.

SIMMS SONS & COOKE LTD

W. J. Simms Sons & Cooke Ltd.,
Building and Civil Engineering Contractors.

Head Office: Haydn Road, Sherwood, Nottingham. Tel: Nottingham 66264 (10 lines)
Sales Office: British Simms Buildings Ltd., 12 York Buildings, Adelphi, London W.C.2. Telephone Trafalgar 3383
BRANCHES: LONDON · BIRMINGHAM · MANCHESTER · LEEDS ADEN · TORONTO

Williamson Crestaline vinyl flooring *was chosen by the Sperry Gyroscope Company for this Super Clean Area in one of their Brentwood factories where Rotorace Gyros for military and civil aircraft are assembled. Crestaline is the ideal flooring for this 'special duty' application because it neither powders nor creates dust when walked on, and it can be butt welded at the joints to form a continuous surface with no cracks to harbour harmful dust particles. Photograph by courtesy of the Sperry Gyroscope Company Limited*

℗37

Williamson give you the pick of the vinyls with Crestaline sheet and Crestalux tiles

With Crestaline sheet and Crestalux tiles you have a range of vinyls for all flooring purposes . . . not just ordinary vinyls but the pick of the vinyls, unequalled in their price range for their **brilliantly creative colours, distinguished marbled effects, degree of flexibility and smooth, impervious finish.** You also get these added advantages with Crestaline and Crestalux:—

Quality: Exceptionally high plasticised poly-vinyl chloride content—not less than 67%. And Crestaline and Crestalux are manufactured by a unique process that is designed to obtain the maximum advantage from this massive vinyl composition.

Wear: Resistance to wear of Crestaline and Crestalux is greater than that of any other flooring of comparable cost. This is due to their high vinyl content.

Luxurious tread: Massive vinyl/plasticiser content also gives Crestaline and Crestalux high recovery from indentation, ensures quietness and resilience underfoot.

Economical cost: Crestaline and Crestalux possess all the luxury appeal of expensive imported vinyls, yet are competitively priced with flooring materials having a far lower vinyl content. On a true cost plus satisfaction basis, Crestaline and Crestalux have no equal.

Remember, Crestaline and Crestalux give you all the luxury appeal of superb finish, resilient tread, comfort and quietness underfoot plus ease of installation and long, hard wearing life at a cost per square foot per year of service life that is unequalled by any other flooring of comparable quality!

To help with your flooring problems, Williamson maintain a Technical Advisory Service. Advice is freely available and consultation places you under no obligation.

WILLIAMSON CRESTALINE and CRESTALUX

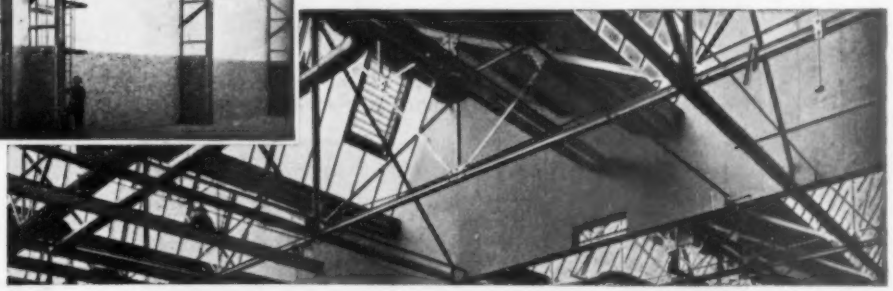
VINYL FLOORING

JAS. WILLIAMSON & SON LIMITED, LANCASTER · FOUNDED 1844 · TELEPHONE: LANCASTER 5222

cape PLANNED fire control

Lightweight fire wall.

By means of a continuous programme of fire testing and research, a complete range of specifications have been evolved for the fire separation and protection of industrial and commercial buildings, using Asbestolux non-combustible asbestos insulation board. Please write for details.



Fire stop in roof truss.

CAPE ASBESTOLUX

THE NON-COMBUSTIBLE ASBESTOS INSULATION BOARD

CAPE BUILDING PRODUCTS LIMITED. A subsidiary of The Cape Asbestos Company Limited

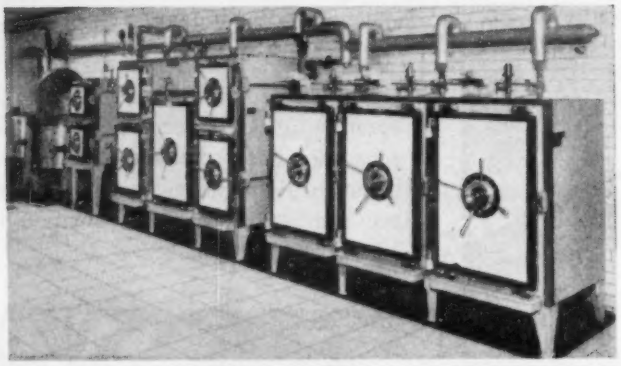
COWLEY BRIDGE WORKS · UXBRIDGE · MIDDLESEX · TELEPHONE: UXBRIDGE 37111 · TELEGRAMS: INCORRUPT, UXBRIDGE
TELEX: 23471.

Also at Manchester, Birmingham, Glasgow, Newcastle

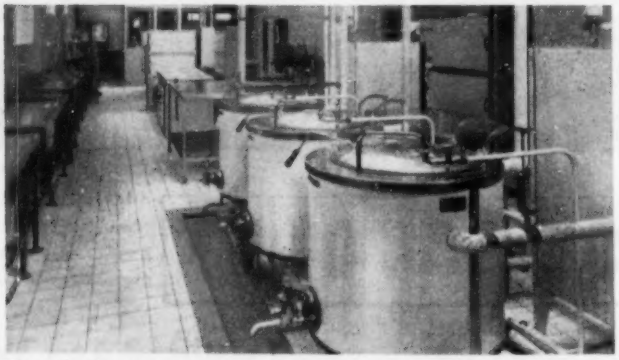
A268/P

KITCHEN PLANNING

'Why planned kitchens?' Simply, that if a kitchen is to be run efficiently the movement of the food between the time it arrives raw to the time it is served must be a speedy, integrated process. A well-planned kitchen is essential to meet large-scale catering requirements. But wise pre-planning demands a comprehensive and detailed knowledge of every aspect of the catering industry from the problems of engineering to the niceties of design. Now, more and more firms with kitchen planning problems are calling in Moorwood-Vulcan, the acknowleged specialists in this field.



Steaming ovens installed in a hospital kitchen in Yorkshire. Moorwood-Vulcan specialise in kitchen planning on all scales.



These boiling pans are part of a recent contract for the planning and installation of kitchen equipment for a large works canteen.

A JOB FOR EXPERTS

Some months ago the amalgamation of Moorwoods of Sheffield and the Vulcan Hart Corporation of Baltimore, U.S.A. brought together two companies with enviable reputations in the catering world as experts in kitchen planning.

MOORWOOD-VULCAN

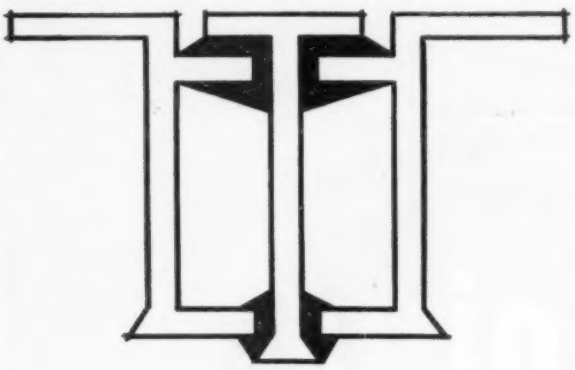
MOORWOOD-VULCAN LTD. (INCORPORATING E U K CATERING MACHINERY LTD.)
7 RATHBONE PLACE, LONDON, W.1 Tel.: MUSeum 5090

MVS 96364

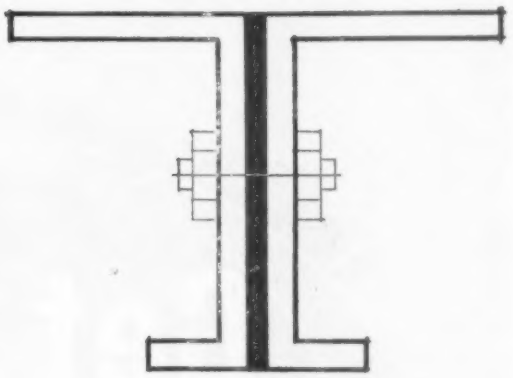
Cascelloid

Cascalite shatterproof translucent sheeting is manufactured by Cascelloid (Division of the British Xylonite Co Ltd), Abbey Lane, Leicester. Tel: 61811
London Office & Showrooms: 27 Blandford Street, W1. Tel: WELbeck 9211

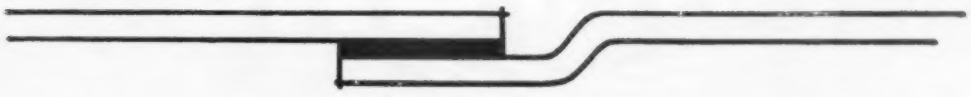
NUMBER 2 – METAL TO METAL JOINTS



Bostik Mastic No. 1560



Prestik



Prestik

Finding the right sealing compound

These days it's not easy for the architect or the builder to keep bang up-to-date with the latest improvements. This is especially the case with sealing compounds, where the already large number designed to do specialists' jobs is steadily increasing. That's why 'Bostik', who have just about every sealing compound you require, have prepared these notes on the **four main types** of sealing compound.

'Prestik' preformed sealing strips will maintain a flexible seal against years of weathering. They expand and contract with the joint that they're sealing, will not harden, get brittle or shrink. All grades exclude dust, rain and snow: the special grades resist petrol and oil.

'Bostik' butyl-based mastics are made from a butyl rubber base which gives permanent elasticity. They have very good ageing and weathering qualities, and strong adhesion to most building materials. Some form a dry tack-free surface in a few hours and a tough resilient seal in a few days, others remain tacky. They will not shrink, crack or slump.

'Bostik' gun mastic is based on oils and resins and provides a good general-purpose, easily applied sealant for joints which will not be subject to large movements.

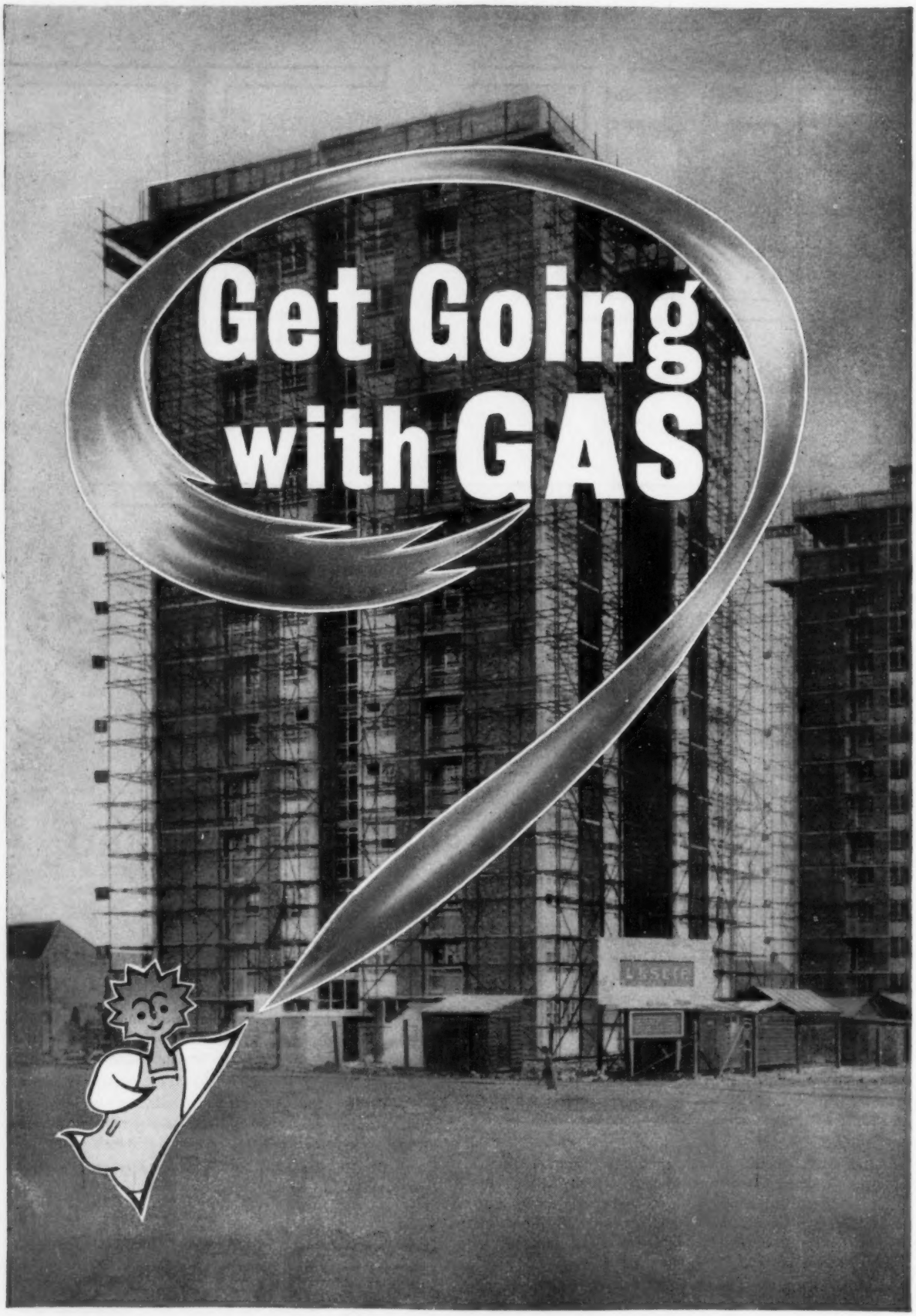
'Eostikol' sealing compounds are based on polysulphide synthetic rubber. Applied in liquid form, they cure in position without shrinking and form a tough, permanent, weathertight seal to resist all arduous conditions met in curtain wall structures. A wide choice of grades provides different physical characteristics to suit different conditions.

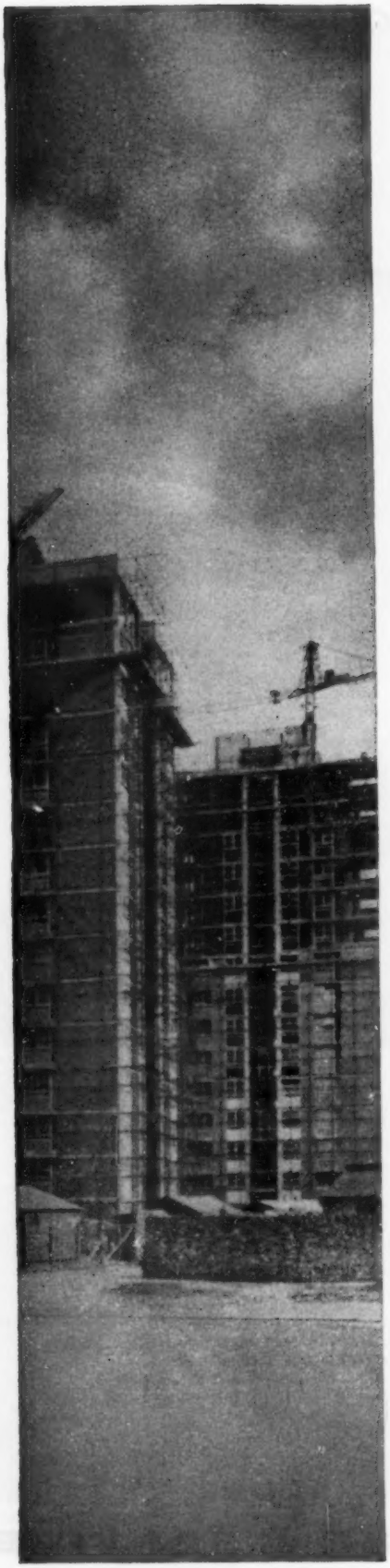
One last word about 'Bostik' research: if you've any problems to do with sealing or bonding building materials, don't hesitate to get in touch with us. It's our job. We may have solved your problem already. And if we haven't, we'll get down to it right away.

Write to: 'Bostik' Building Advisory Department, B.B. Chemical Co. Ltd, Leicester.

Bostik MAN FRIDAY TO THE BUILDING INDUSTRY

The words 'Bostik', 'Bostikol' and 'Prestik' are trademarks registered in the U.K. and many other countries. Manufactured by B.B. Chemical Co. Ltd (the 'Bostik' people), Leicester, England


Get Going
with GAS



THE FLEXIBLE FUEL SERVICE

Get going with *Gas*, whatever the job.

Gas **gives fierce or gentle *Heat*;**

fast or slow *Heat*; flexible *Heat*;

fully automatic *Heat*...but always clean,

economic and reliable *Heat*.

With the benefits of the industry's research and its free technical advisory service, enjoy confidence with *Gas*.

ISSUED BY THE GAS COUNCIL

Contractors: Leslie & Co. Ltd.

K1/8

Photographed 20 years after fixing. Cleaners' Store Room at Blurton School, Stoke-on-Trent.
Architect: J. R. PIGGOTT, T.D., F.R.I.B.A., Stoke-on-Trent City Architect.
Quarry Suppliers: A. WOOD & CO. (Longton) LTD., Tile Fixing Specialists.

Photographed 19 years after fixing. Corridor at Longton High School, Stoke-on-Trent.
Architect: J. R. PIGGOTT, T.D., F.R.I.B.A., Stoke-on-Trent City Architect.
Quarry Suppliers: A. WOOD & CO. (Longton) LTD., Tile Fixing Specialists

Photographed 20 years after fixing. Cloakroom at Chell Secondary Modern School, Stoke-on-Trent.
Architect: J. R. PIGGOTT, T.D., F.R.I.B.A., Stoke-on-Trent City Architect.
Quarry Suppliers: MOORE & BROCK LTD., Builders' Merchants, Crewe.

...but bevelled panels keep you

THAT'S EASILY ANSWERED—simply because Celotex Bevelled Panels provide just about the finest form of interior thermal insulation obtainable today. Insulation for any kind of ceiling in almost any kind of building: insulation against the loss of heat in winter and excessive outside heat in summer: the efficient insulation that only Celotex cane fibre can ensure. Three different types: Natural, Highlight and Flame-resistant surfaces provide a variety of finishes suitable for all applications. Whichever type is preferred, Celotex Bevelled Panels permit dry construction to give a crack-free modern ceiling plus thermal insulation and an attractive textured base for further decoration if desired.

Consult **CELOTEX**® at ceiling level

Two important free Celotex services—the Celotex Acoustical Advisory Service and the Celotex Technical Advisory Service—are both readily available for discussion and advice at the planning stage. Whatever your ceiling problem, Celotex can solve it. There is, of course, no obligation, simply 'phone London, Elgar 5717.

Information can also be given regarding the complete and extensive range of Celotex products for every type of building construction. 'Phone as above or write to Celotex Limited, North Circular Road, Stonebridge Park, London, N.W.10.

CELOTEX* CEILINGS

THE WORLD'S MOST

how can possibly ***warm?***

Other CELOTEX* insulation products

INSULATING BOARD
Manufactured from long tough sugar cane fibre, Celotex Insulating Board is the perfect material for wall, roof and ceiling linings. Supplied with either Natural or Highlight finish, it can be erected in its original state or given further decorative treatment.

FRIB
Celotex Flame Resistant Insulation Board is manufactured from closely woven sugar cane fibres, faced on both sides with asbestos. This combination provides exceptional thermal insulation qualities and flame resistance. In the BS 476 surface spread of flame test—FRIB (rated class 1) showed no spread of flame whatsoever.

ROOF INSULATION
Permanent insulation for every type of roof decking can be provided by Celotex roof insulation board. Tough, light in weight, this low density cane fibre board cuts fuel and heating plant costs. Its naturally rough-textured surface provides a strong bond with bitumen.

SARKING
With a thermal insulation value *three times greater* than that of wood sarking, this Celotex product is the ideal material for use where complete roof insulation is required. It is produced from closely woven Celotex cane fibres and top-surface treated with a compound with high water repellent qualities.

METAL FIXING SYSTEMS
Celotex has available a metal fixing system for every type of Celotex insulating material. Each system is designed for a specific purpose. Speed, low cost and versatility are the outstanding features.

SERVICE
Installation of Celotex materials is carried out by highly skilled specialist contractors operating throughout the United Kingdom.

* CELOTEX is a registered trade mark

WIDELY USED INSULATION

Architects :
Messrs
Huckle & Partners
30, Queen Anne St.,
London, W.1.

●

Contractors :
Messrs
Allnatt (London) Ltd.
Park Royal House
23, Park Royal Road,
London, N.W.10.

GLASCRETE cast stone facings to beams and columns with infilling of cast stone mullions and COL-O-ROCK exposed aggregate panels were incorporated in this new office block at Olympic Way, Wembley.

CURTAIN WALLING

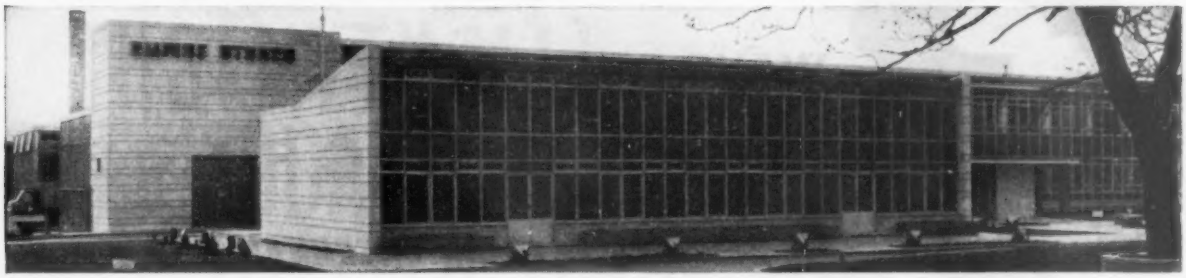
By

J. A. KING & Co., Ltd

181, Queen Victoria St., LONDON, E.C.4

Telephone : Central 5866

News from Hull



Empire Stores Ltd. New warehouse and offices at Horbury Road, Lupset, Wakefield.

Architects: Michael Egan & Partners, London.
Main Contractors:—A. McAlpine & Son Ltd., London.
Plumbing Sub-Contractors:—J. H. Shouksmith & Son Ltd., Micklegate, York.

New Warehouse and Offices in Wakefield

Executive and Staff washrooms fitted with 'Standard' equipment.

Empire Stores is one of the country's largest mail order houses. Established in 1831, the firm has expanded rapidly since the war. In line with this expansion, new warehouses and offices have been built in Wakefield where a predominantly female staff of over 120 attend to the dispatching of 30,000 parcels weekly.

In the planning stages of the new building, considerable thought was given to the working conditions and comfort of the staff. In the washrooms, the importance of using 'Standard' vitreous china fittings was stressed as these were considered to be the best, most up-to-date and hygienic.

In the employee's toilet Trimline wash basins were fitted in an island range against a terrazzo plinth, and the water closets are also from the Trimline range. A 'Standard'drinking fountain has also been incorporated.

Kingston basins have been installed in the Staff and Executive toilets, together with the Sano low-level water closet suites. Elsewhere throughout the building, Trimline suites have been fitted.

The advanced design of 'Standard' equipment when combined with the use of vitreous china, gives the architect many advantages when specifying for offices, public buildings and factories. Besides a pleasant appearance, 'Standard' equipment always remains permanently hygienic. The percentage of replacements is small, and the equipment keeps its good looks throughout its long life.

(*Above*) *The elegant Kingston washbasin which represents a great advance in bathroom equipment design has been used in the Executives' washroom at Empire Stores. Like all other 'Standard' bathroom equipment, it is available in a range of five colours, plus white.*

(*Left*) *Trimline wash basins and water closets in the employees' washroom. The Trimline is low in cost with a high standard of design. Made from vitreous china, it has been used extensively in municipal and other low-cost housing schemes.*

3 WAYS OF CLADDING IN LIGHTWEIGHT CONCRETE

1 ***AS AN EXTERNAL SKIN***

2 ***AS A PERMANENT SHUTTERING***

3 ***AS A COMPLETE WALL UNIT***

ALMOST HALF THE WEIGHT OF DENSE CONCRETE

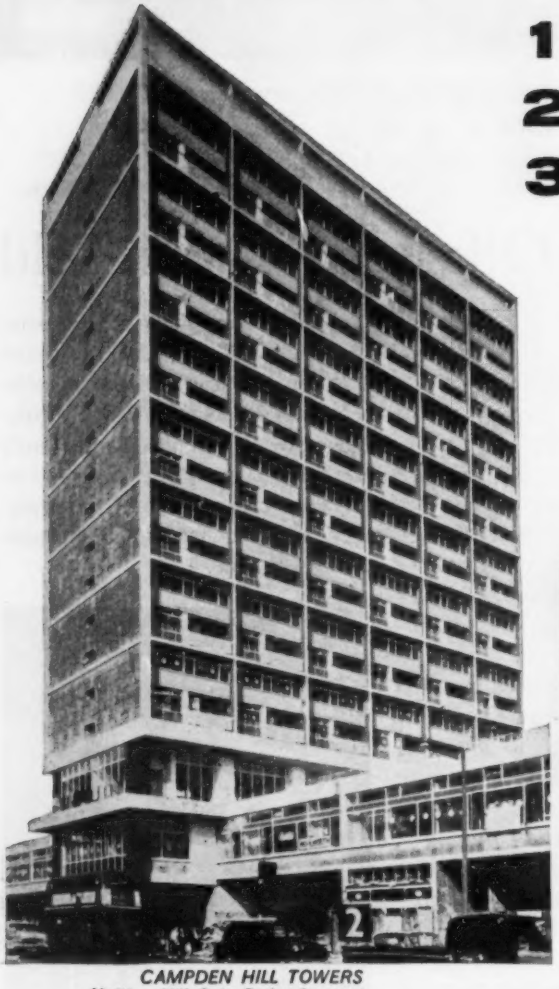
EXCELLENT THERMAL INSULATION

WATERPOOF AND FUNCTIONAL

4" UNIT GIVES 4-HOUR FIRE RESISTANCE
(Fire Research Station tested)

SAVING IN COSTS, SITE LABOUR, Etc.

PERMANENT DECORATIVE FINISH



CAMPDEN HILL TOWERS
Notting Hill Gate Redevelopment
Architects: Cotton, Ballard & Blow
General Contractors: Messrs. Tersons Ltd.

KADUNA LAW COURTS
Designed and Constructed by Ministry of Works, Northern Region, Nigeria

TURNPIKE HOUSE
Notting Hill Gate Redevelopment
Architects: Cotton, Ballard & Blow
General Contractors: Messrs. Tersons Ltd.

CHEECOLITE

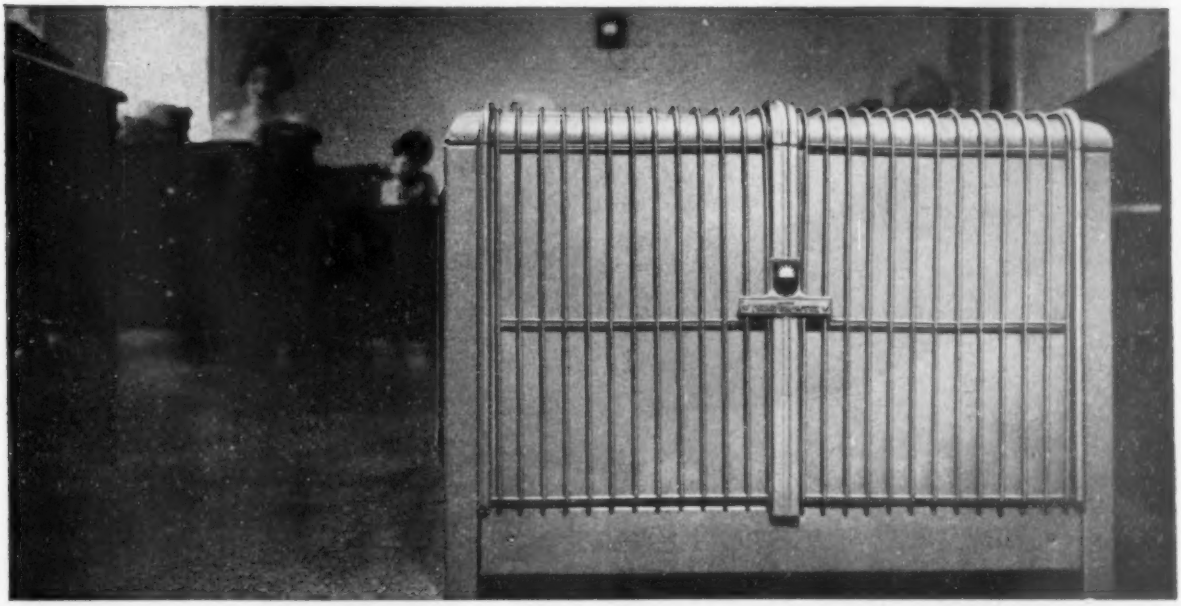
PRE-CAST LIGHTWEIGHT CLADDING

* *LICENCE ARRANGEMENTS AVAILABLE FOR CERTAIN OVERSEAS TERRITORIES*

Write for further information

CHEECOL PROCESSES LTD., KEELAND HOUSE, 644 OXFORD ROAD, READING, BERKS Tel.: Reading 50821 (3 lines)
London Office: 51 WESTMINSTER PALACE GARDENS, S.W.1 Tel.: ABBey 6862

Install THERMODARE NIGHT STORAGE CENTRAL HEATING at the best time NOW



Now is the time to install Thermodare night storage Central Heating in your premises. A quick decision could substantially cut your heating costs this winter.

Installation is simple and cheap — and the Thermodare system is individually planned for your requirements.

Because Thermodare heaters charge themselves from the mains overnight—releasing the stored-up heat during the day—you pay only the special cheap night electricity rate, thus running costs are cheaper than with other systems.

Thermodare night storage Central Heating provides evenly radiated warmth that cannot cause stuffiness (so that staff work all day with maximum efficiency) or draughts (avoiding lost working days due to colds and sickness).

This is the ideal form of heating for modern offices, factories, showrooms, etc.

For full details write, phone or call at your local electrical contractor or Electricity Board Showroom.

THERMODARE

THERMODARE (GT. BRITAIN)
YORK MANSION
94/98 PETTY FRANCE LONDON S.W.1.
TEL: ABBey 6556/9

DETAILS OF THERMODARE UNDERFLOOR HEATING AND INFRA-RED HEATERS FOR INDUSTRY ARE AVAILABLE FROM THE SAME ADDRESS.

CHEMICAL RESISTANT CEMENTS

MEMBRANES AND COMPOUNDS

CORROSION TECHNICAL SERVICES LIMITED

SUNLEYS ISLAND · GREAT WEST ROAD · BRENTFORD · MIDDLESEX

Telephone: ISLEWORTH 8445 (5 lines)

Telegrams and Cables: CORROPROOF · BRENTFORD · HOUNSLOW

FLOORING for toughness

Tough is hardly a strong enough word to describe jointless floors based on EPIKOTE resins. Of great mechanical strength, they are resistant to abrasion and impact, and withstand severe chemical attack, thus reducing maintenance costs. They are easily applied on a variety of surfaces, with a non-skid finish if required.
We shall be pleased to recommend formulators and flooring contractors on request.

Shell Chemicals

EPIKOTE RESINS

SHELL CHEMICAL COMPANY LIMITED

Marlborough House, 15-17 Gt. Marlborough Street, London, W.1.

E.F.I.

SHELL and EPIKOTE are registered trade marks

FOR THAT LUXURY LOOK

THE MAY FAIR CHOOSES "VITROLITE"

When the May Fair Hotel, London, recently refitted 200 bathrooms, Pilkingtons' "VITROLITE" was chosen to give that luxury look. The new "VITROLITE" with its extra high quality finish, in a full range of colours, gives walls a more attractive covering than ever before. "Vitrolite" is hard-wearing and non-crazing, its colours will not wear off.

FIXERS: D. W. Price & Son Ltd., London.

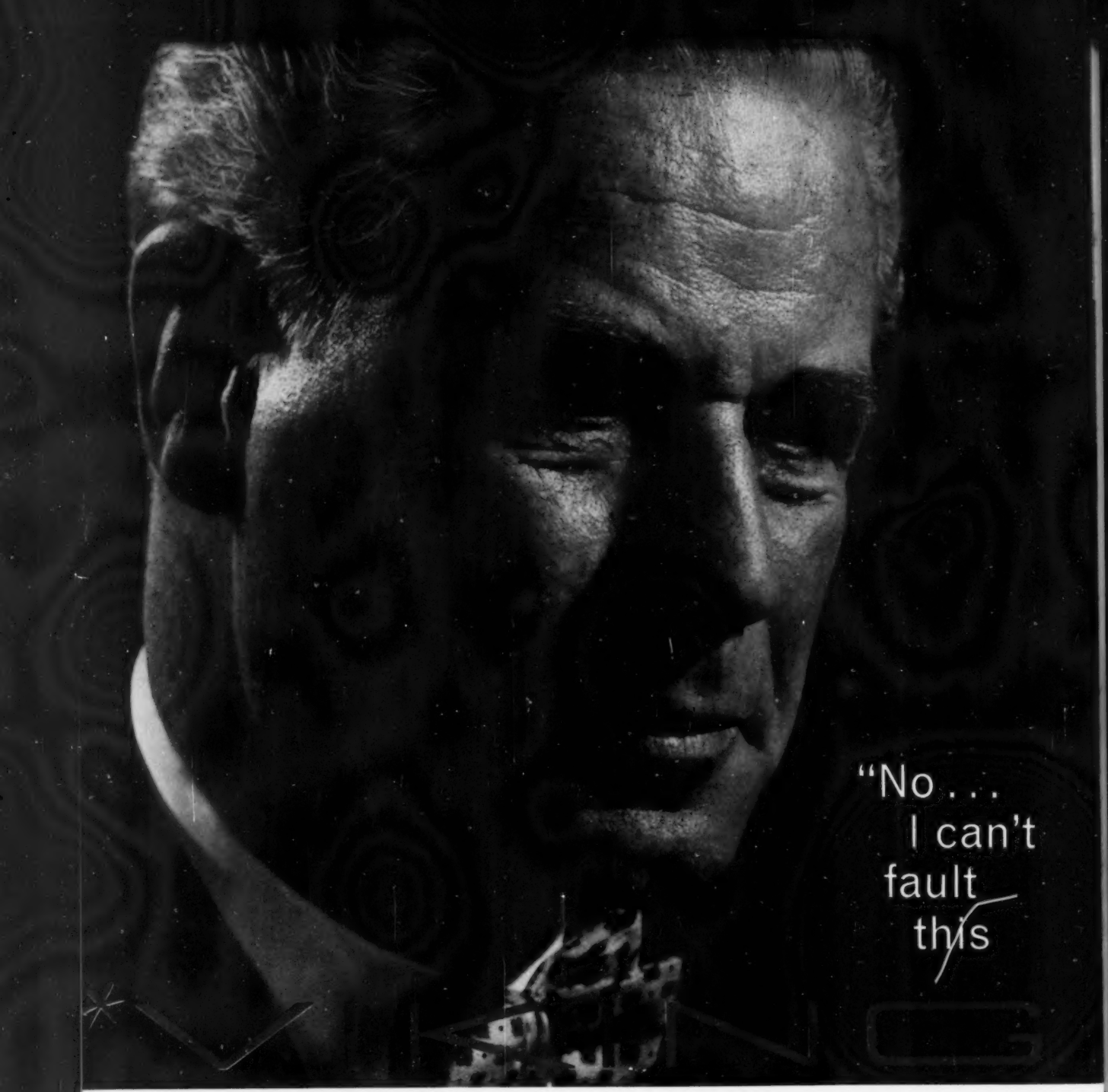
"Vitrolite" is a registered trade mark of Pilkington Brothers Limited.

Supplies are available through the usual trade channels.

For full information on "Vitrolite" please write to the manufacturers:

PILKINGTON BROTHERS LIMITED

ST. HELENS LANCS. (TEL: ST. HELENS 4001) SELWYN HOUSE, CLEVELAND ROW, ST. JAMES'S, S.W.1. (TEL WHITEHALL 56/2)



What I've been looking for! Has all the essentials . . . clean lines . . . perfectly hygienic . . . first-time flush with finger-tip action . . . extra powerful . . . silent, too! Yes! And all plastics! But with a difference . . . 'Tufolene' . . . virtually indestructible . . . excellent finish . . . hard, high gloss. Won't chip . . . won't crack. Available in wide range of pastel colours as well as black and white.

Design-wise? Years in advance, I'd say!

What's the name again . . . 'VIKING'? By whom? Oh, well, of course! There's five generations of experience behind it.

H'm . . . better get full technical details and colour range . . . must consider including 'VIKING' in that new specification!"

*Preferred for quality

Made by **CISTERNS LIMITED** Addingham Ilkley Telephone Addingham 444

Leading manufacturers of plastics plumbing fixtures

madam's converted...

Photographed at FROYS

.....to In-Sink-Erator, America's first garbage disposer proved in more than a million kitchens

madam won't be penalised by pedal bins . . . Hygienically, she downs garbage in an instant under a running tap, feeding waste into the In-Sink-Erator, which automatically grinds and drains away peelings, fruit skins, stones, rinds, bones etc. In-Sink-Erator is economical to run, saves time and labour. Installation cost is low, with no maintenance required.

now you'll want to know the score on these points

IN-SINK-ERATOR'S FIVE YEAR WARRANTY covers all parts for 5 years. During the first year service is free.

IN-SINK-ERATOR'S AFTER-SALES SERVICE is speedily provided by authorised local In-Sink-Erator service agents.

IN-SINK-ERATOR'S SILENCE stems from sealed joints between the disposer, sink openings and perfect balancing of rotary shredder. Grinding noise and motor hum is minimal.

IN-SINK-ERATOR AUTOMATIC REVERSING ACTION is *really* automatic—self-governing with no special controls of any kind—the built-in patented reversing mechanism "thinks for itself" reversing the direction of the shredders if the load gets extra heavy. Shredding elements also reverse automatically every time machine is switched on. Jams are prevented, doubling the life of the shredding elements.

PRICES INC. P.T. Model 333 *39½ gns. retail.*
Model 77 *47 gns. retail. (Automatic reversing action)*

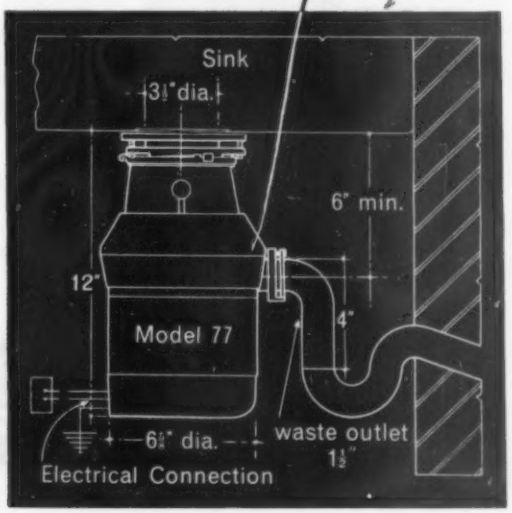
For complete specifications, contract details, prices and the name and address of your local distributor write or telephone our Technical Bureau.

Wynbourne-Satoba Equipment Limited

90-96 CITY ROAD, LONDON E.C.1 TELEPHONE: CLERKENWELL 6006

In·Sink·Erator

see how compact! only 12" in length



undercover agent for hush-hush disposal proved in more than a million kitchens

What all architects should know about Maxhea

MAXHEAT DEFINED Maxheat is an oval electric tubular unit system of controllable space heating. It has been proved in all types of buildings, is adaptable to all interiors, and functions without attention.

MAXHEAT'S ECONOMY No waste with Maxheat—it is 100% efficient. With a properly designed installation controlled by a Wardle thermostat, the required temperature can be maintained almost to a degree—continuously.

QUICK HEAT RISE Maxheat's oval shape enables 90% of the surface to be swept by the heat induced air stream. Efficiency is therefore maximal and the temperature rise rapid.

DECORATIVE APPEAL Maxheat's unobtrusive appearance and select colours make it suitable for unrestricted specification. It is obtainable in hammer finish in lilac, florentine bronze, copper rose, silver, old gold or plain brown. Maxheat can also be supplied in other colours to choice.

UNIT SYSTEM Maxheat is supplied in lengths from 2-17 ft. singly or up to six tier. It is suitable for wall or floor mounting. Loadings are 60 or 80 watts per foot. Standard and special outlets are available.

EASY INSTALLATION Maxheat is easily installed with the wall or floor brackets supplied. Banks of tubes are pre-assembled or single tubes can be built-up with standard multiple connectors.

APPLICABILITY Maxheat is suitable for all space heating applications. It is also obtainable as a portable unit. To meet certain agricultural and industrial uses gilled and round tube heaters are available in lengths from 2-8 ft. and 2-12 ft. respectively.

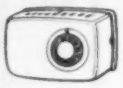
QUALITY Materials and engineering are guaranteed to be first class.

Flick-switch warmth...fumeless, labour saving

Maxheat

WARDLE ROOM THERMOSTAT

Styled by a leading industrial designer this unit is available in domestic and industrial models. Features include: new thermal design with accelerator heater for accurate control, easily read scale with adjustable stops, impact resisting case. Rating: 20 amps A.C.



OVAL ELECTRIC TUBULAR HEATING SYSTEM

space heating for all applications

MAXHEAT END CAP

The tube is cut on the oblique to give easy access from the front to the wiring terminals. The end cap is flanged for tight closure and secured by a retaining screw.

MAXHEAT ELEMENT

A high-grade nickel chrome coil which operates at black heat, it is fully insulated and continuously supported throughout its entire length.

THE ECONOMY OF THE DESIGN

Maxheat's oval shape permits loading at 80 watts per foot with absolute safety. Fifteen feet of Maxheat at this loading is equivalent to twenty feet of ordinary round tube limited to 60 watts per foot. The diagram shows how the heat induced air stream sweeps 90% of the surface.

APPEARANCE

Overall projection of the brackets is a mere 2¼ inches. With the colours available, Maxheat becomes an integral, unobtrusive furnishing.

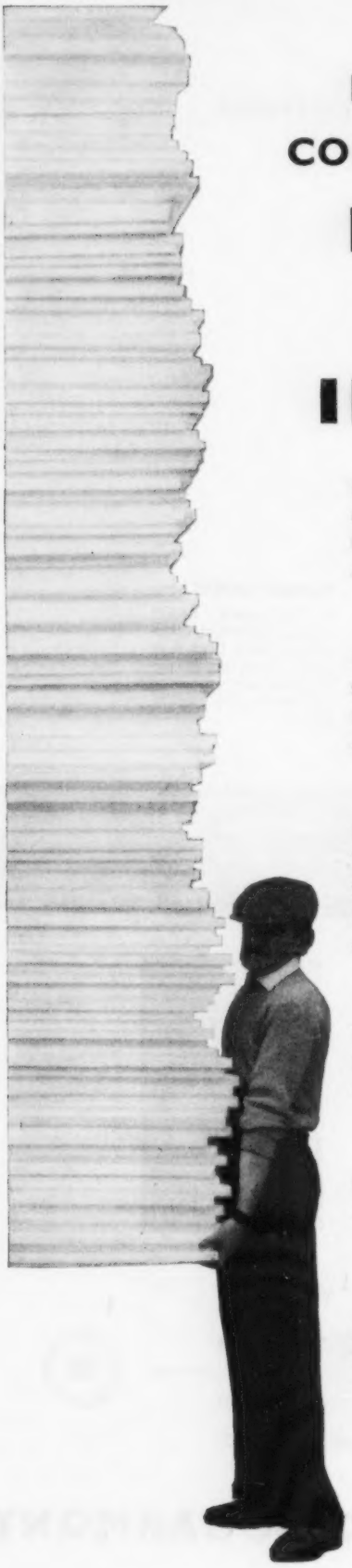
Ask one of our Sales Engineers to call—there's no obligation

THE WARDLE ENGINEERING CO LTD

OLD TRAFFORD MANCHESTER 16 Telephone: TRAfford Park 1801

London Office: 34 Victoria Street, S.W.1 Telephone: ABBey 4072 and 1356

OR SPACE HEATING WITH COLOUR HARMONY

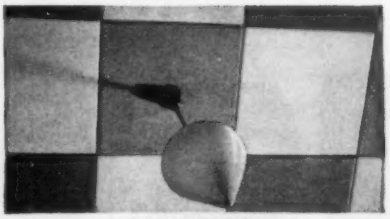


MORE AND MORE CONTRACTS COMPLETED WITH FLAMINGO FOAM INSULATION

For insulating floors, walls, roofs, ceilings and attics in new and existing buildings, including farm buildings and other exposed structures.

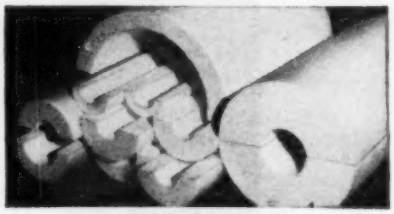
FLAMINGO BOARD

Heat, cold, damp and sound-resistance for new and old ceilings. Flamingo tiles provide an excellent base for emulsion paints.



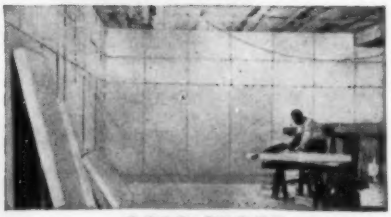
CEILING TILES

FLAMINGO pipe shells in lengths 2′, 2′ 6″ and 3′, thicknesses from ½″ to 18″ fit all standard pipes, safeguarding them effectively against freezing and condensation.



PIPE SHELLS

The ideal insulation for cold stores, refrigerators, cooling systems, ice and dry ice factories, refrigerated vans.



COLD STORE

Please send for free sample and full technical details to

FLAMINGO FOAM LTD.
34 Victoria Street, London, S.W.1.
Telephone: ABBey 1543
A Monsanto Company

Monsanto
Regd.

you could play golf

Any day you specify WEYDEC* you could take the afternoon off. With an easy mind too, for you'd have solved all problems of finish, separate surfaces and adhesives, cost and time limitations just by specifying this plastic-surfaced constructional board that saves money, time and labour and always keeps its good looks. So for your next job, simply pick up a WEYDEC swatch, choose your thickness, design and colour (or specify your own from Sanderson's range), write it down and off you go!

** Factory bonded, melamine surfaced quality Weyroc chipboard. Full information and free sample from your WEYDEC distributor or direct from the address below*

just specify **weydec**

THE AIRSCREW COMPANY & JICWOOD LTD., WEYBRIDGE, SURREY. TEL: WEYBRIDGE 2242|7

AP 29

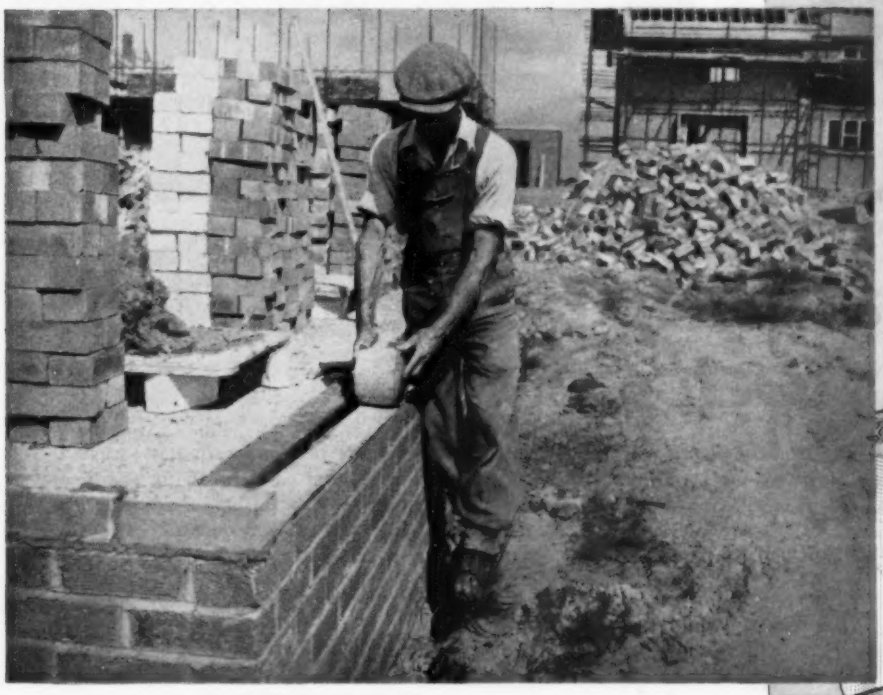
all controlled by . . .

Specialists in all forms of air treatment

Industrial Fan & HEATER CO. LTD.

"AIRFLO" WORKS, BIRMINGHAM, 11
phone: BIRMINGHAM VICtoria 2277
also at LONDON, MANCHESTER, SWANSEA
A MEMBER OF THE SIMMS GROUP OF COMPANIES

DAMP PROOF COURSE BY ANDERSON



Asbestos is one of the most indestructible substances known to man. Its fibres remain unaffected by fire, acid or decomposition of an organic nature. Capillary action (a primary cause of failure in many dampcourses) cannot take place as asbestos fibres do not absorb water.

Bitumen is of course well known for its permanent waterproofing qualities. Traces have been discovered in buildings 5,000 years old, an indication of its timeless properties.

Anderson "Bestos" combines asbestos and mineral asphaltic bitumen to provide a tough, flexible, completely waterproof dampcourse of exceptional durability

"Bestos" complies fully with B.S.S. 743/1951/Type 5c. Samples and prices will be sent gladly on request.

D. ANDERSON & SON LIMITED

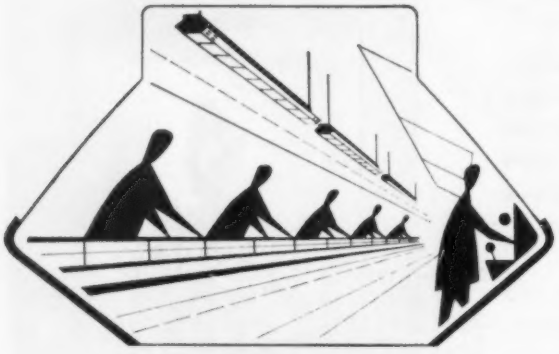
STRETFORD, MANCHESTER Telephone : Longford 4444 · OLD FORD, LONDON, E.3. Telephone : Amherst 9381

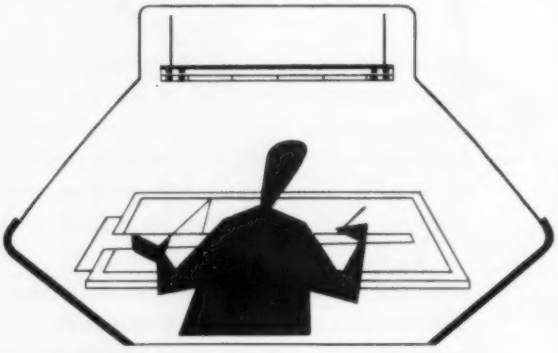
AEI SLIMLINE Radiant Heaters

Today's most adaptable heater

3 RATINGS, 3 LENGTHS, 3 FIXINGS, 3 BEAMS . . . make these efficient, low-cost units today's most versatile heat source. Fine reflectors and many ingenious fittings 'beam' the heat where you want it . . . when you want it . . . for a one-bench installation or half-a-mile of factory floor. No waste here in heating unoccupied areas! Robust construction combines with 'slimline' design . . . first-class workmanship combines with competitive prices. Stock, specify, use or sell these versatile units for yourself.

Non-corrodible extruded aluminium body. Anodised mirror finish parabolic reflector.
Robust long-life Inconel metal sheathed elements
A unique feature is the ability to angle the heater from flexible suspension





3 LOADINGS:
1 kW, 2 kW, 3 kW

LENGTHS:
3 ft 3 in, 5 ft 10 in, 8 ft 6 in

3 FIXINGS:
Angle-bracket. Conduit. Chains.

BEAMS:
Standard. Double-width.
Double intensity.

—AND ECONOMICAL TOO! Prices £4.8.0: £6.16.0: £8.4.0: guard extra in each case

For price leaflet and technical literature on planning an installation contact your nearest AEI office or the address below

AEI

Associated Electrical Industries Ltd

HEATING AND WELDING DEPARTMENT TRANSFORMER DIVISION

TRAFFORD PARK, MANCHESTER, 17

L/1007

SANITATION IN HOTELS AND RESTAURANTS

"Methought a voice within the tavern cried
'When all the temple is prepared within
Why nods the drowsy worshipper outside?'"
Omar Khayyam: Fitzgerald.

By A. F. B. Nall, A.M.I.San.E., A.M.Inst.W.

In hotels and restaurants generally as well as in those modern temples of health within—the bathrooms and washrooms, five-star amenities are impossible on a one-star budget. Faultless sanitary equipment, therefore, serves the well-being of hotelier and restaurateur equally with that of their patrons. Constant use by a continuous stream of visitors, oft inconsiderate or heavy-handed, demands a very high standard of durability, scrupulous hygiene and a most attractive appearance. Suitably impressed, today's casual hotel visitor may be tomorrow's resident; inadequate attention to comfort and cleanliness in the restaurant erases the memory of good cuisine.

Ceramic Glazed Fireclay Sanitaryware fulfils every demand of arduous duty. The exceptional strength of Fireclay, to which a vitrified glaze is fused, offers the highest resistance to careless or ham-fisted use, the glaze permanently withstanding thermal shock as well as physical strain. The minimum of easy cleaning quickly restores the original porcelain-like lustre. The elegant modern design of Fireclay appliances avoids dust and germ traps, blending aesthetic appeal with impeccable hygienic condition. A wealth of colour choice affords harmony with any and every decorative scheme.

Modern Hotel and Restaurant plans should embody the principle that comfort and health are indivisible; the protection of health demands sanitary appliances of the highest order. No longer is "h. and c. in every room" something to boast about. The aim should be a private bathroom to every bedroom, containing ideally, a bath, washbasin, w.c. suite and bidet. Shower cubicles with Glazed Fireclay receivers however, save space and conserve capital. In public washrooms the durability of Fireclay washbasins is particularly desirable, while large sized basins minimise external splashing. The clean-lined hygienic qualities of Glazed Fireclay are particularly suitable for urinal ranges where integral cisterns and buried pipework obviate metal polish and rag—and the risk of eyesores; Fireclay corbel-type w.c. pans facilitate cleaning even further.

In both main and service kitchens, Fireclay sinks and drainers promote and maintain hygiene, resisting arduous use at all times, while Fireclay appliances in staff quarters invite and encourage personal cleanliness.

Fireclay's Ceramic Glaze, whether white or coloured is permanently immune in every case to acidic or alkaline hazards and cleansers of every kind; throughout its long life it resists the effects of cigarette burns, cosmetics and spirituous liquids.

Offering the greatest assurance against broken or cracked ware and loss of amenity during replacement—with its attendant high labour costs—Fireclay prevents the creation of a bad impression, inconvenience, annoyance and possible loss of revenue. The modern—and prudent—equivalent of the tavern-keeper prepares his 'temples of health' with Ceramic Glazed Fireclay appliances. He will have no need to complain of "drowsy worshippers", who remain outside.

A fully illustrated booklet, published in the interest of more and better hygiene and sanitation is available on request

See the exhibits at the Building Centres, London, Manchester and Bristol.

The silence that was Rome...

The new ceiling of the famous Kingston Baths, Bath City and Waterworks Engineer: W. Hartley, A.M.I.C.E., A.M.I.Mech.E., A.M.I.W.E., M.R.S.H.

THE BUILDING EXHIBITION
Olympia London
15-29 November 1961
See Our Exhibit

Originally built by the Romans, the famous Kingston Baths at Bath were lost under debris and growth and were not discovered until 1923.

Recent rebuilding has been necessary to latter-day steel reinforcements and roof, both endangered by damp from the hot springs. The false ceiling consists of Armstrong Corkoustic tiles to prevent crowd echo in the hall below and deaden reverberation of fan and air noise in the ducts. The tiles also prevent condensation and allow for ease of access for inspection and repair. And their appearance tones with the Roman surroundings.

Travertone and Cushiontone are other Armstrong tiles with a high sound-absorption coefficient. Armstrong experts are at your service to assist you in the choice of acoustic materials and the solving of acoustic problems. Please write for full details.

The next advertisement in this series will feature the showroom of De la Rue Bull Machines Ltd in Southampton Row.

Armstrong acoustics

Armstrong Cork Company Ltd., Acoustics Department,
Carlisle Road, Colindale, London, N.W.9. Tel: COLindale 9744.
Also at 24 Fitzwilliam Place, Dublin 2. Telephone: Dublin 61907.

Architect-designed for **Westclox**

the new **Executive 10**

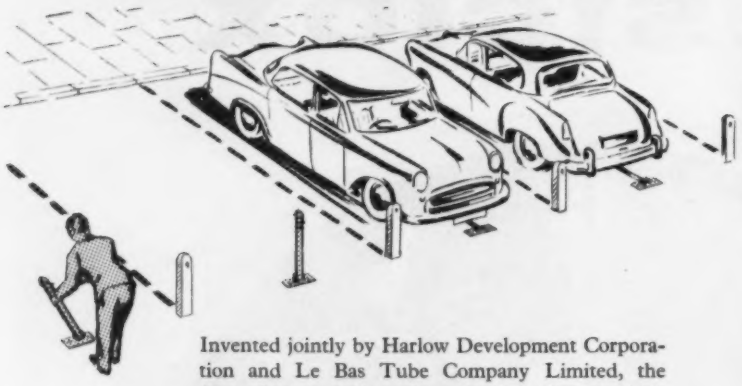
Designed in collaboration with a firm of top design consultants, the Executive 10 combines reliability with legibility and first-class design. It has been accepted by the Council of Industrial Design for inclusion in the Design Index.

Executive 10 is a flush-fitting electric wall clock, 10" in diameter. In white or black, £6. 12s. Also in this new Westclox range of commercial wall clocks is the larger Monitor 12. With a diameter of 12", this clock is of the most modern transatlantic design and costs £8. 2s. 6d.

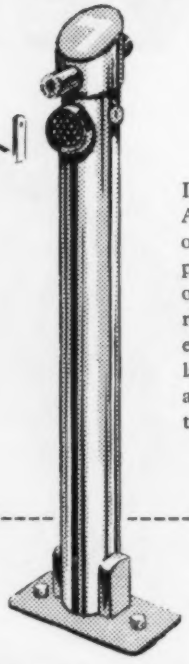
Details and list of agents from

WESTCLOX STRATHLEVEN DUMBARTON SCOTLAND

controlled reservation of parking space with AutopA* car park posts



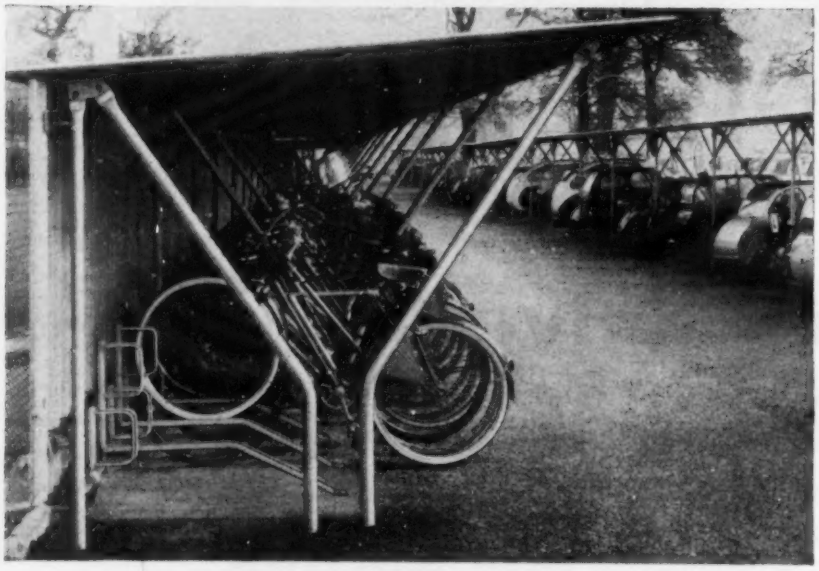
Invented jointly by Harlow Development Corporation and Le Bas Tube Company Limited, the AutopA is a foolproof mechanical device which dispenses with the need for on-the-spot supervision.



In the locked position, the AutopA is a rigid vertical post, obstructing entry to the parking space. A key, held only by the authorised user, releases the locking mechanism enabling the AutopA to be laid down horizontally so that a vehicle can be driven into the reserved space.

AutopA posts and VelopA holders are hot-dip galvanised.

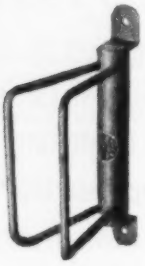
modern bicycle parking and storage with VelopA* bicycle holders



Part of an installation of covered bicycle and motor-cycle storage equipment supplied to Kodak Limited, Stevenage

–supplied separately for fixing to ground, walls, posts or rails, or as complete units, covered or uncovered, for any required number of bicycles.

- **grip tyre only**
- **simple and effective**
- **unobtrusive**
- **easily installed**
- **wide variety of models**



LE BAS TUBE COMPANY LIMITED City Wall House, 129 Finsbury Pavement, London E.C.2
Telephone: MONarch 8822. Telegrams: Lebasco, Avenue, London

* *Registered Trade Mark*

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ROLLS-ROYCE Aero Engines are rigorously tested
in specially designed plant,
housed in a Booth Steel Structure.
Booth Steelwork is as dependable as
the engines which fly the world over.

Better build with BOOTH Steelwork

and cut the cost of your structure!*

*By taking advantage of the provisions of BS 449 (1959) and further amendments.

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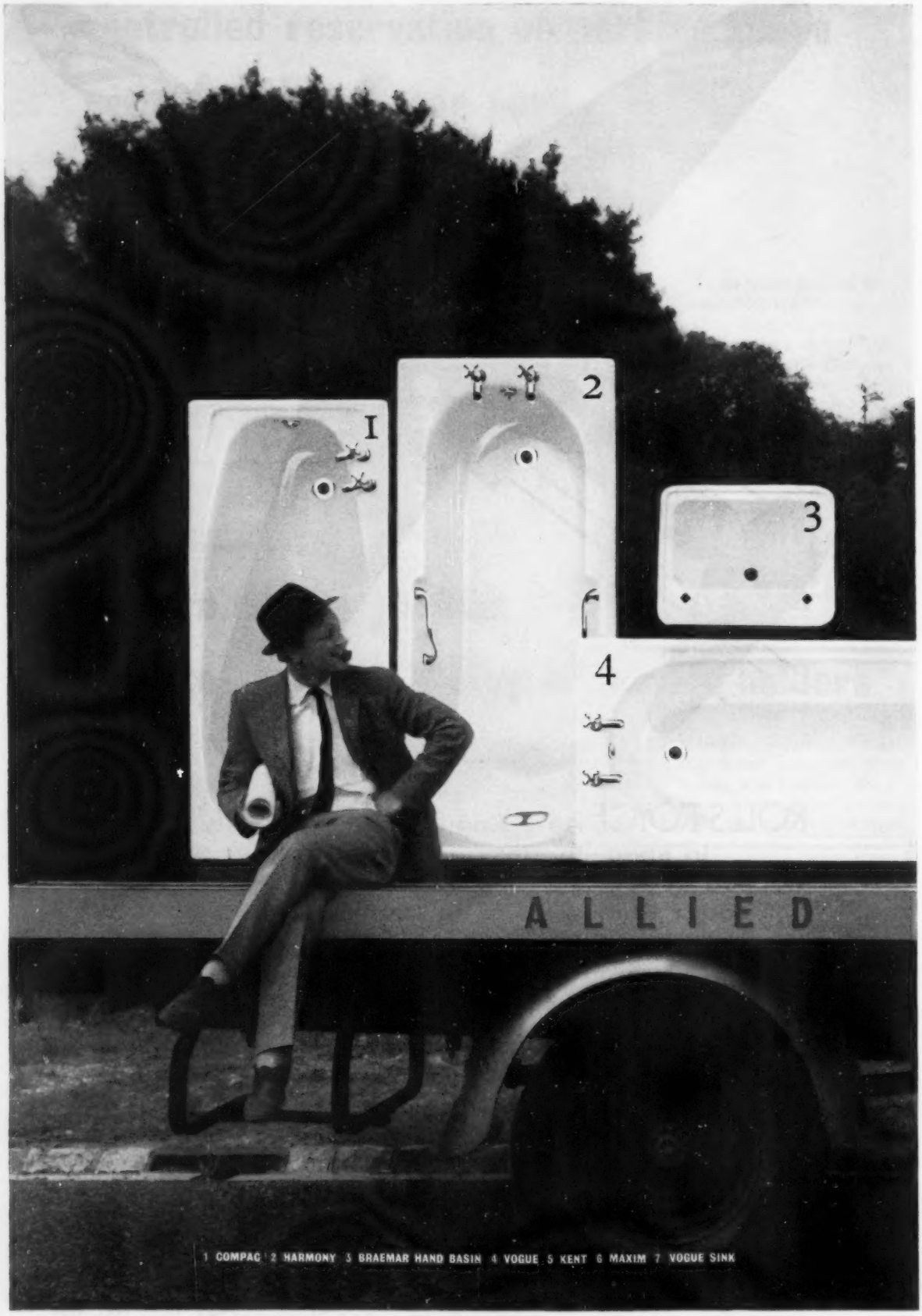
London: 26, Victoria Street, Westminster S.W.1. Phone: ABBey 7162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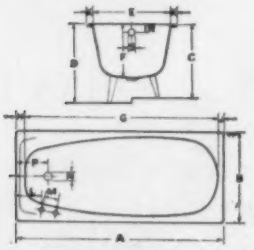
2
3
4
ALLIED
1 COMPAC 2 HARMONY 3 BRAEMAR HAND BASIN 4 VOGUE 5 KENT 6 MAXIM 7 VOGUE SINK

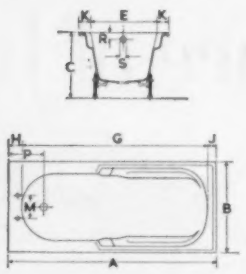
1 COMPAC



A	5′ 0″	F	1′ 3½″	L	7¼″
B	2′ 2″	G	4′ 8″	M	4″
C*1′	9½″	H	2½″	N	2¼″
D	1′ 11″	J	1½″	P	9½″
E	1′ 10½″	K	1¾″	R	2⅜″
				S	1¾″

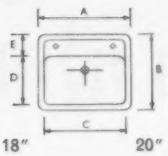
*Standard height unless No. 3A foot is specified.

2 VOGUE HARMONY



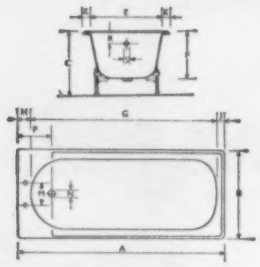
A	5′ 6″	F	1′ 3¼″	K	3⅜″
B	2′ 4½″	G	4′ 11⅜″	M	7⅛″
C	1′ 8¾″	H	4⅛″	P	10¾″
E	1′ 9″	J	2½″	R	2¼″
				S	1¾″

3 BRAEMAR HAND BASIN



	22″ x 18″			20″ x 15″	
A	22″	E	4¾″	A 20″	E 4″
B	18″	F	6½″	B 15″	F 6½″
C	19½″	G	8½″	C 18″	G 7¾″
D	12″			D 10″	

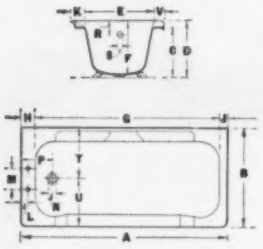
4 VOGUE



A	5′ 6″	F	1′ 3¼″	M	7⅛″
B	2′ 4½″	G	4′ 11⅜″	N	2¼″
C*1′	8¾″	H	4⅛″	P	10¾″
E	1′ 11″	J	2½″	R	2¼″
		K	2¾″	S	1¾″

*Standard height with cast iron panels 19″. Also available with 6′ overall length

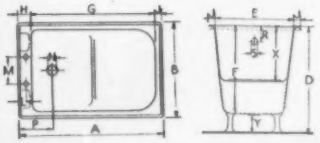
5 KENT



A	5′ 6″	G	4′ 11″	N	2¼″
B	2′ 7″	H	4½″	P	10½″
C	1′ 4½″	J	2½″	R	4½″
D	1′ 6½″	K	4¼″	S	1¾″
E	1′ 11½″	L	2⅞″	T	1′ 4″
F	1′ 5½″	M	7⅛″	U	1′ 3″
				V	3¼″

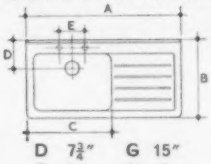
Also available with 6′ overall length

6 MAXIM



A	3′ 7″	G	3′ 1″	N	2¼″
B	2′ 3″	H	4″	P	11″
D	2′ 6″	J	2″	R	4″
E	1′ 11″	L	2⅜″	S	1¾″
F	2′ 0″	M	7⅛″	X	1′ 3½″
				Y	5″

7 VOGUE SINK No. 24221



A	42″	D	7¾″	G	15″	K	12″
B	21″	E	7″	H	2″	L	3″
C	23″	F	4″	J	8½″	M	9″

1 COMPAC For low cost housing. Only 5ft. long, it gives maximum comfort with minimum water consumption. **2 VOGUE HARMONY** With non-slip handgrips, arm-rests and low sides. Ideal for children and the aged. **3 BRAEMAR HAND BASIN** A cast-iron, porcelain enamelled flat rim luxury basin. Supplied with stainless steel frame for counter top assembly, with or without loose overflow. **4 VOGUE** The wide flat bottom, low price and sleek lines make this the most popular bath of all. **5 KENT** A reasonably priced luxury bath with adjustable feet. **6 MAXIM** For small bathrooms and conversions. The shallow end forms a useful seat for children and the aged **7 VOGUE SINK No. 24221** Cast-iron combined sink and drainer in acid-resisting enamel. Left or right handed bowl as required.

. . . AND THERE ARE MANY MORE ALLIED BATHS TO FIT IN WITH ALL YOUR PLANS. THEY COME IN EIGHT STANDARD COLOURS & WHITE . . . OR ANOTHER 8 COLOURS WHICH ARE NON-STANDARD ALL THESE BATHS CAN BE MADE TO STAND IN ANY POSITION

FOR INFORMATION CONCERNING THEIR ENTIRE RANGE OF BATHS, WRITE TO: BATH DIVISION, CADBURY ROAD, SUNBURY-ON-THAMES, MIDDLESEX

82

Powerful Accurate Quick

. . . . . *but no brains*

Twelve holes being simultaneously drilled by this machine.

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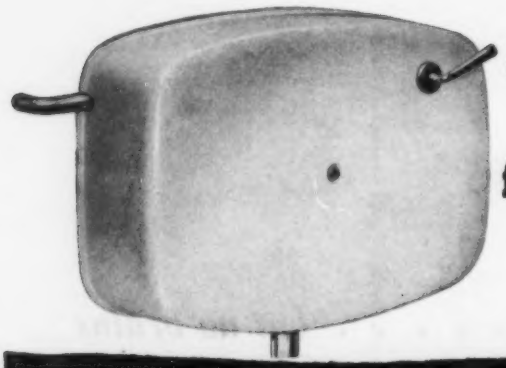

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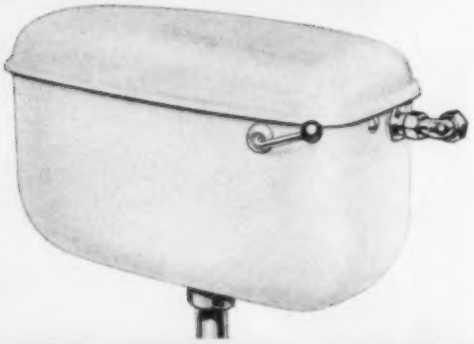

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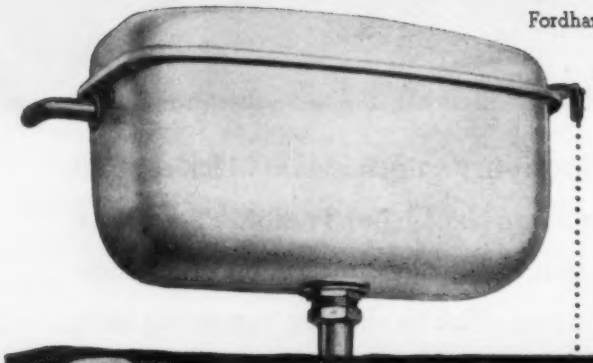

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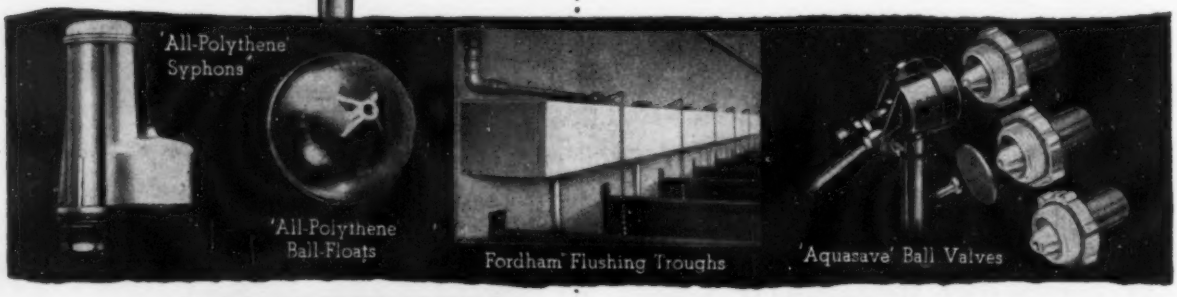

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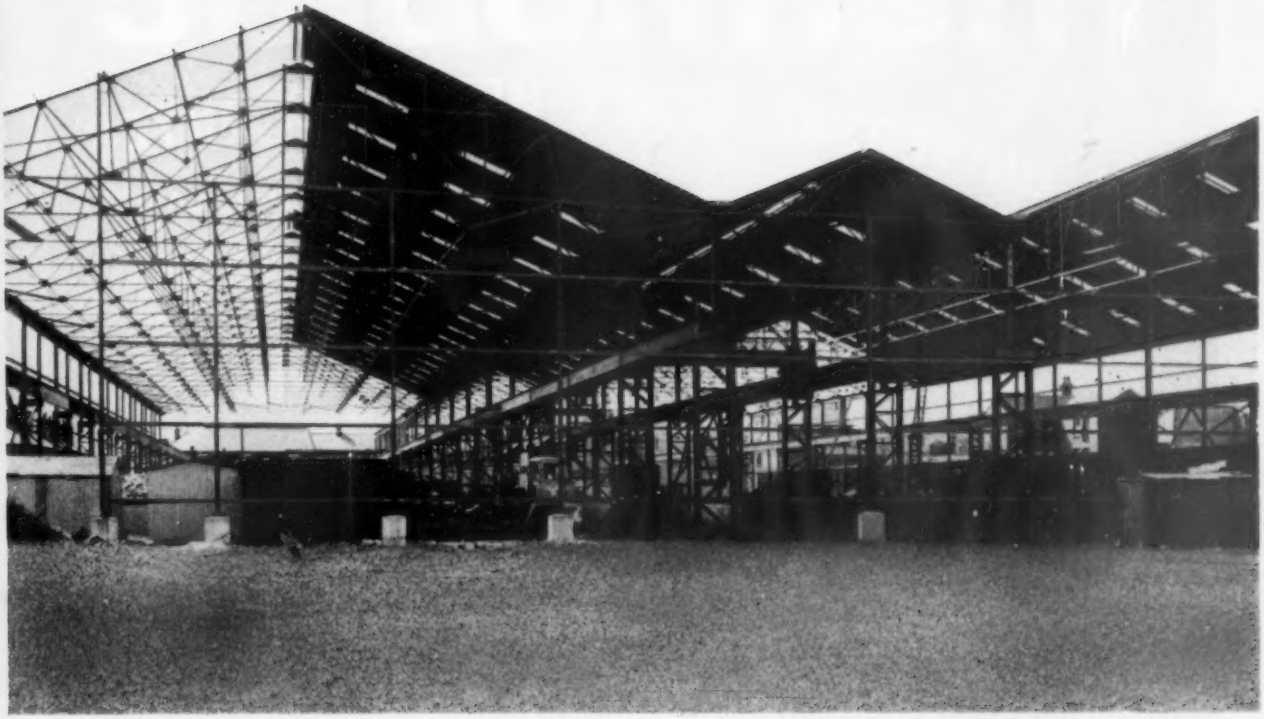

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The Architects' Journal
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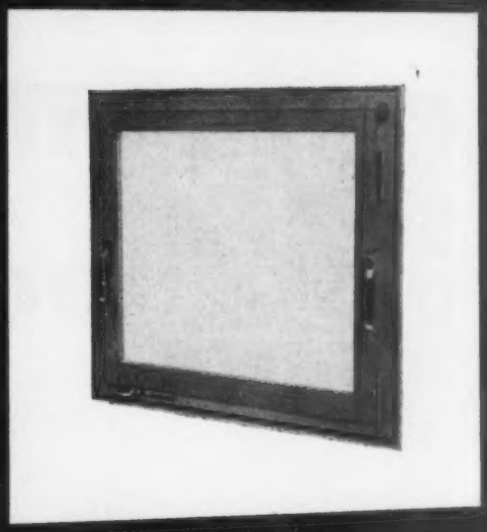
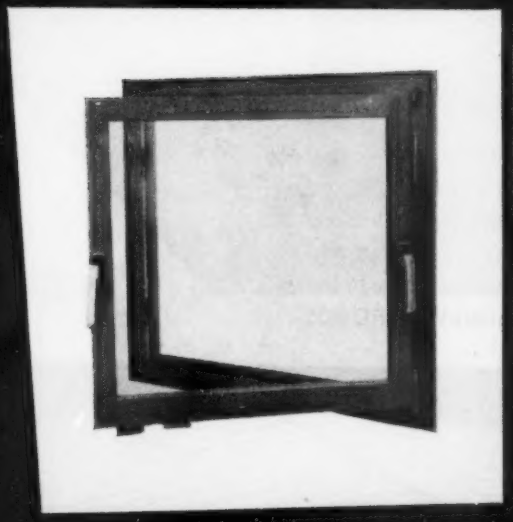
ROTO-VEE windows with two-way opening





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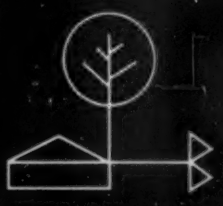

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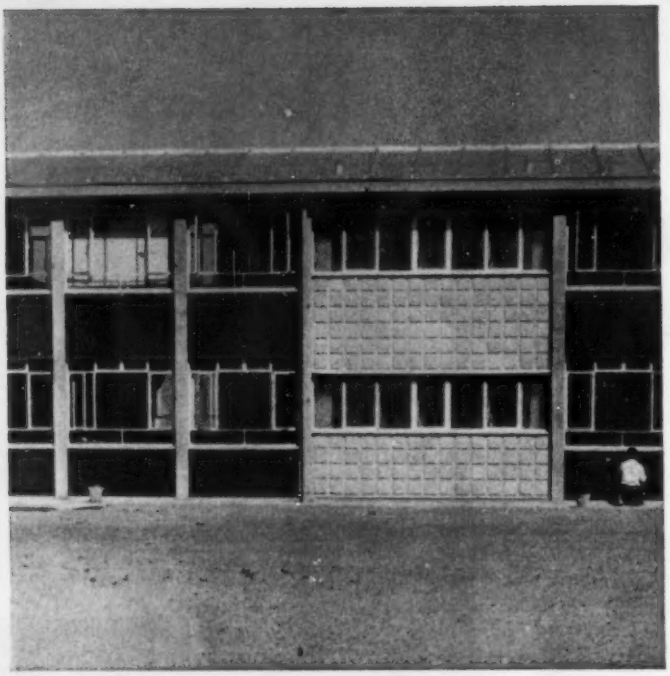

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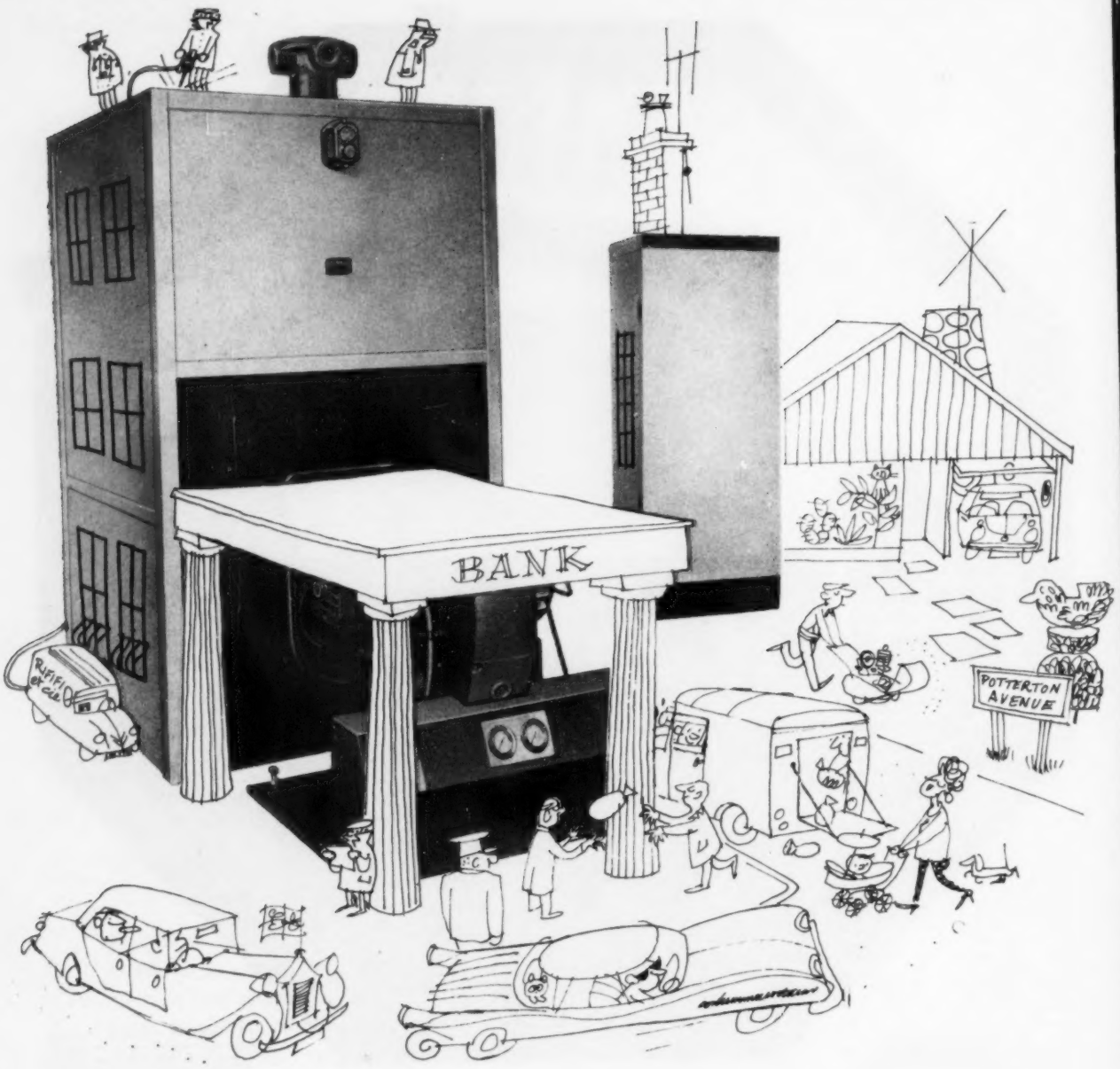

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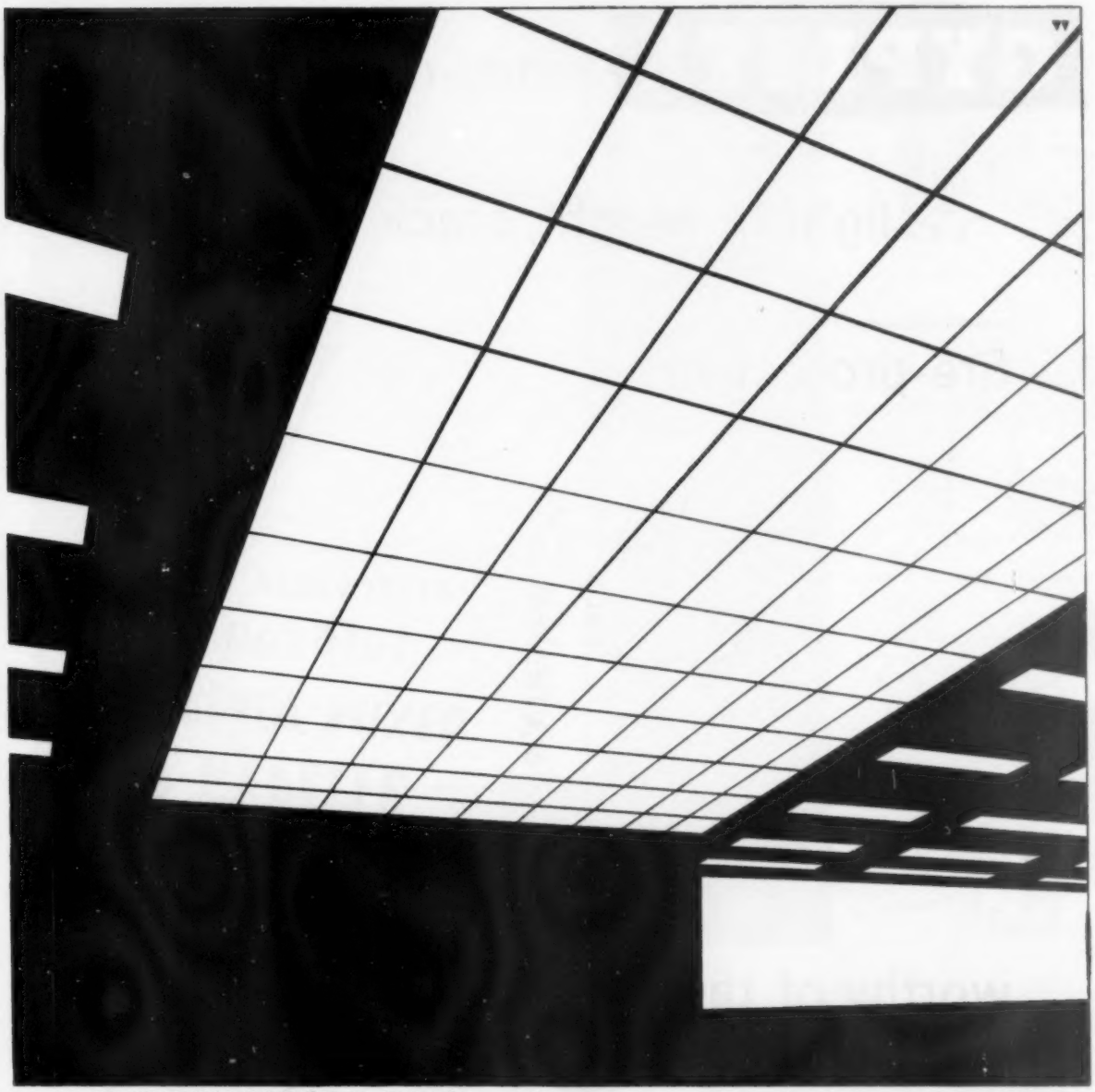

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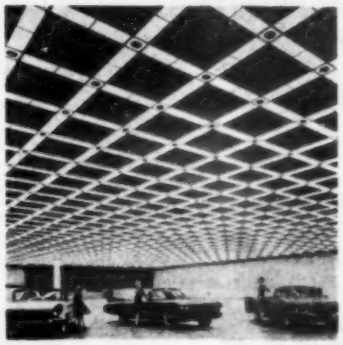

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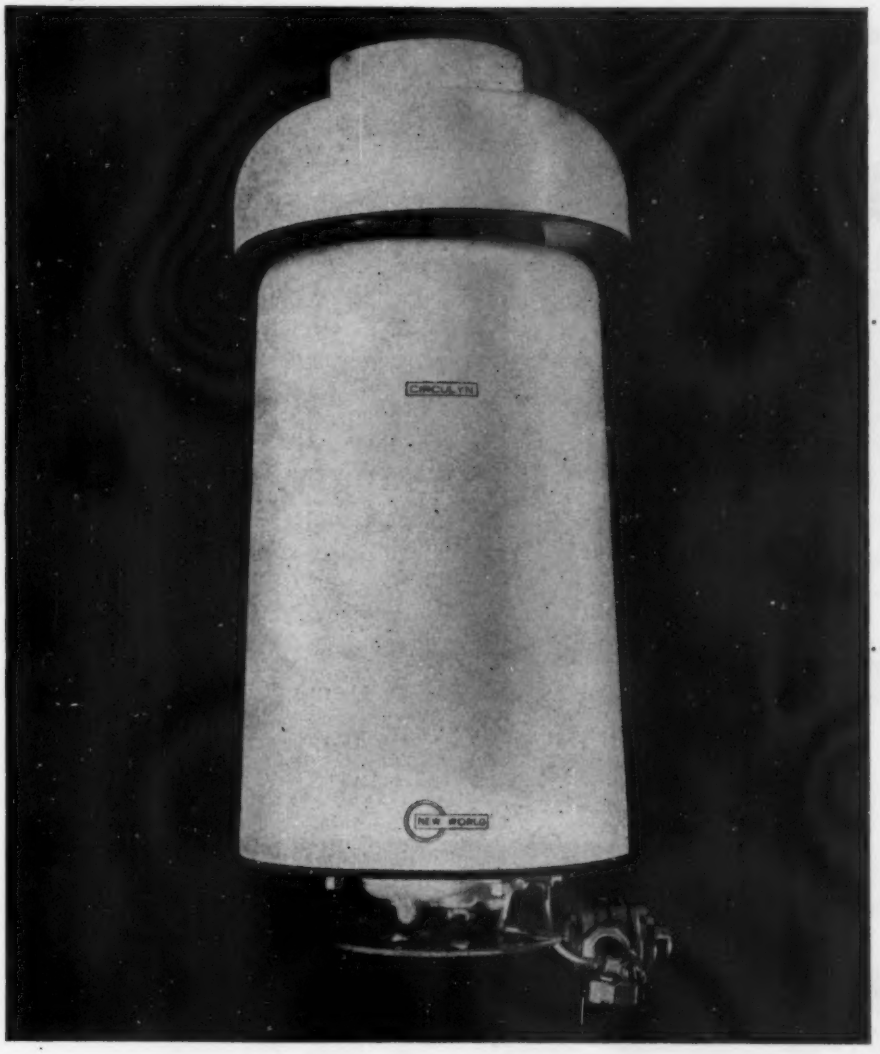

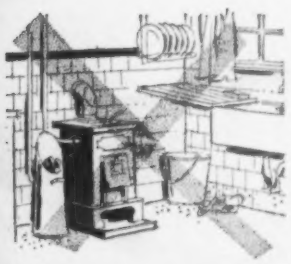

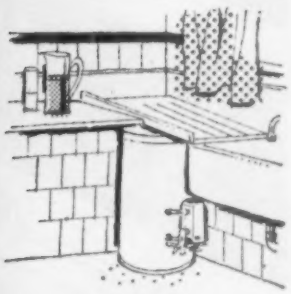

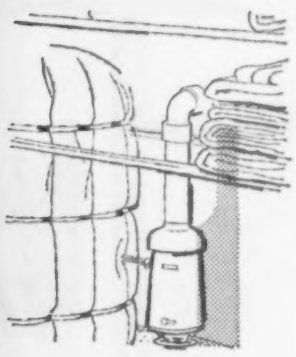

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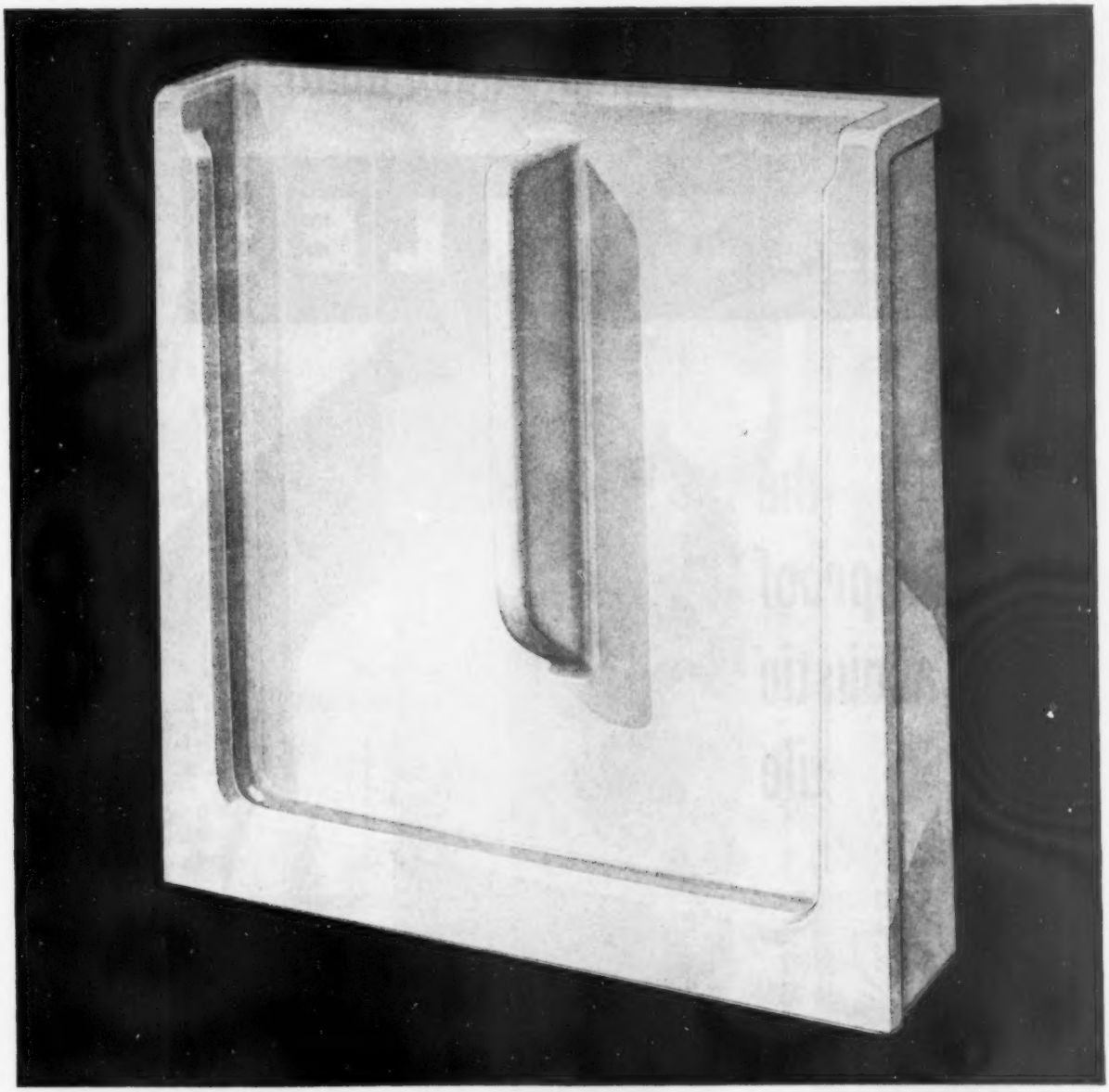

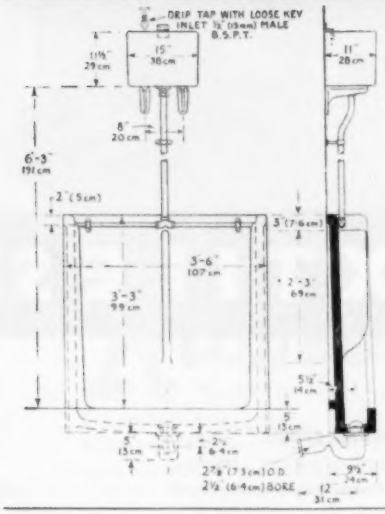

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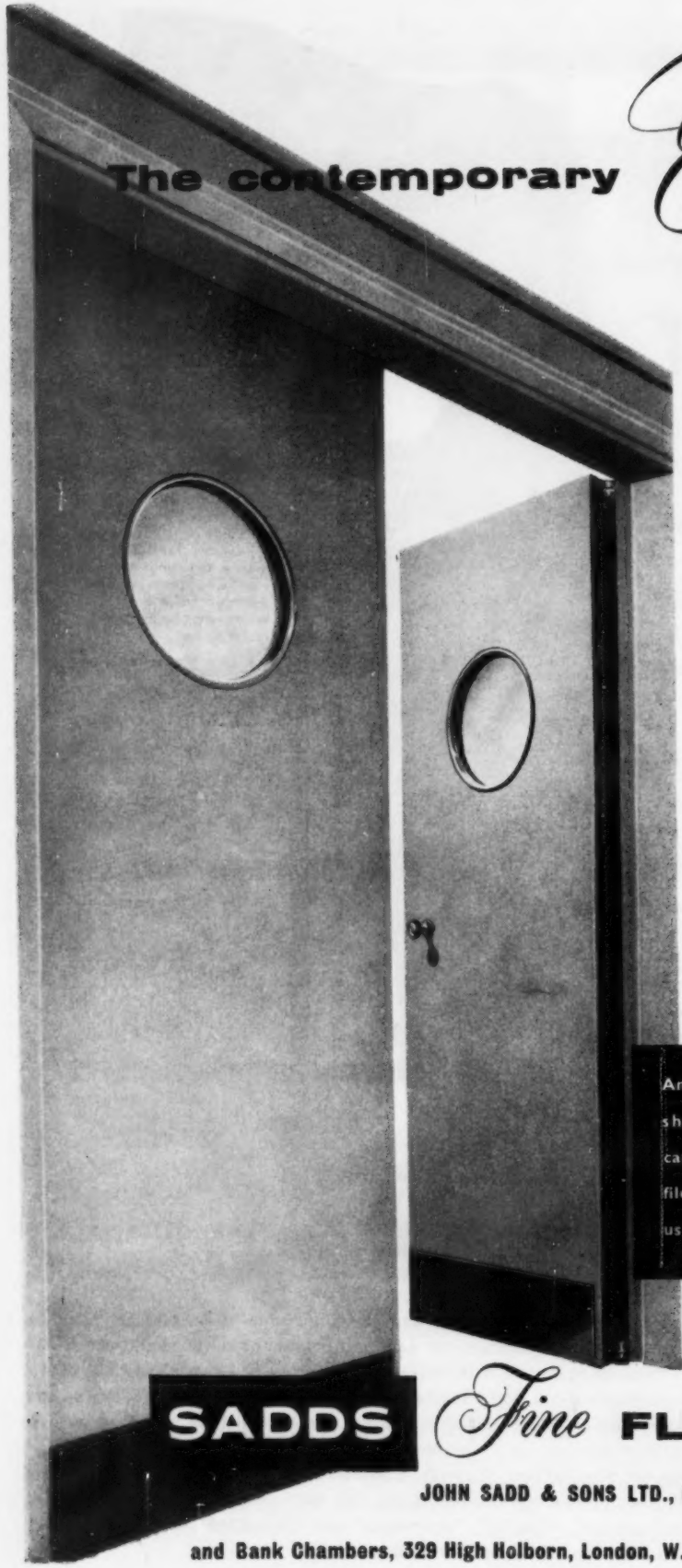

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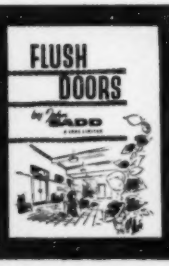

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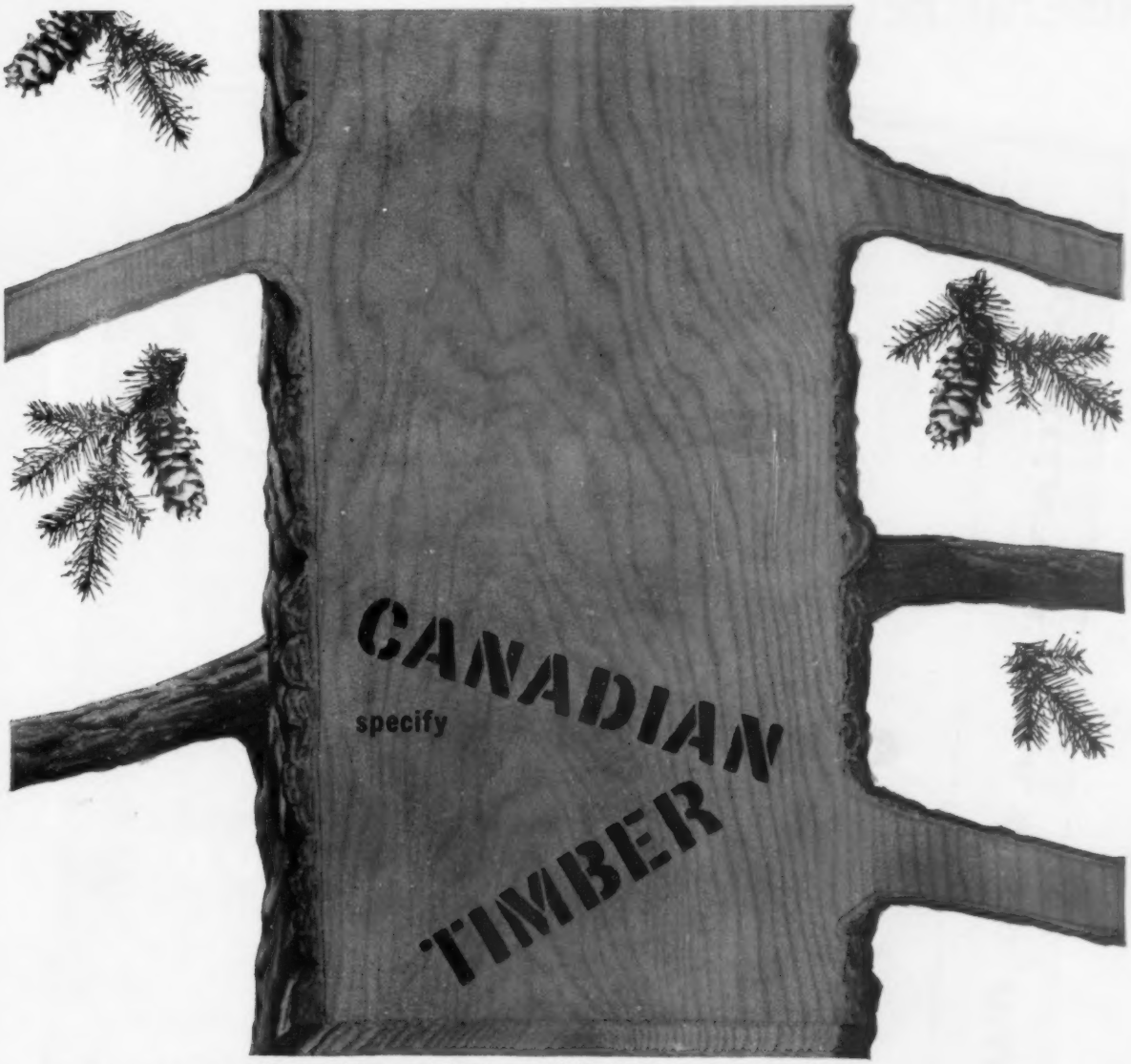

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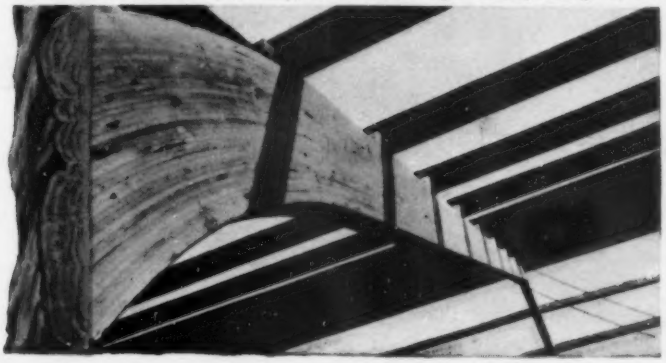

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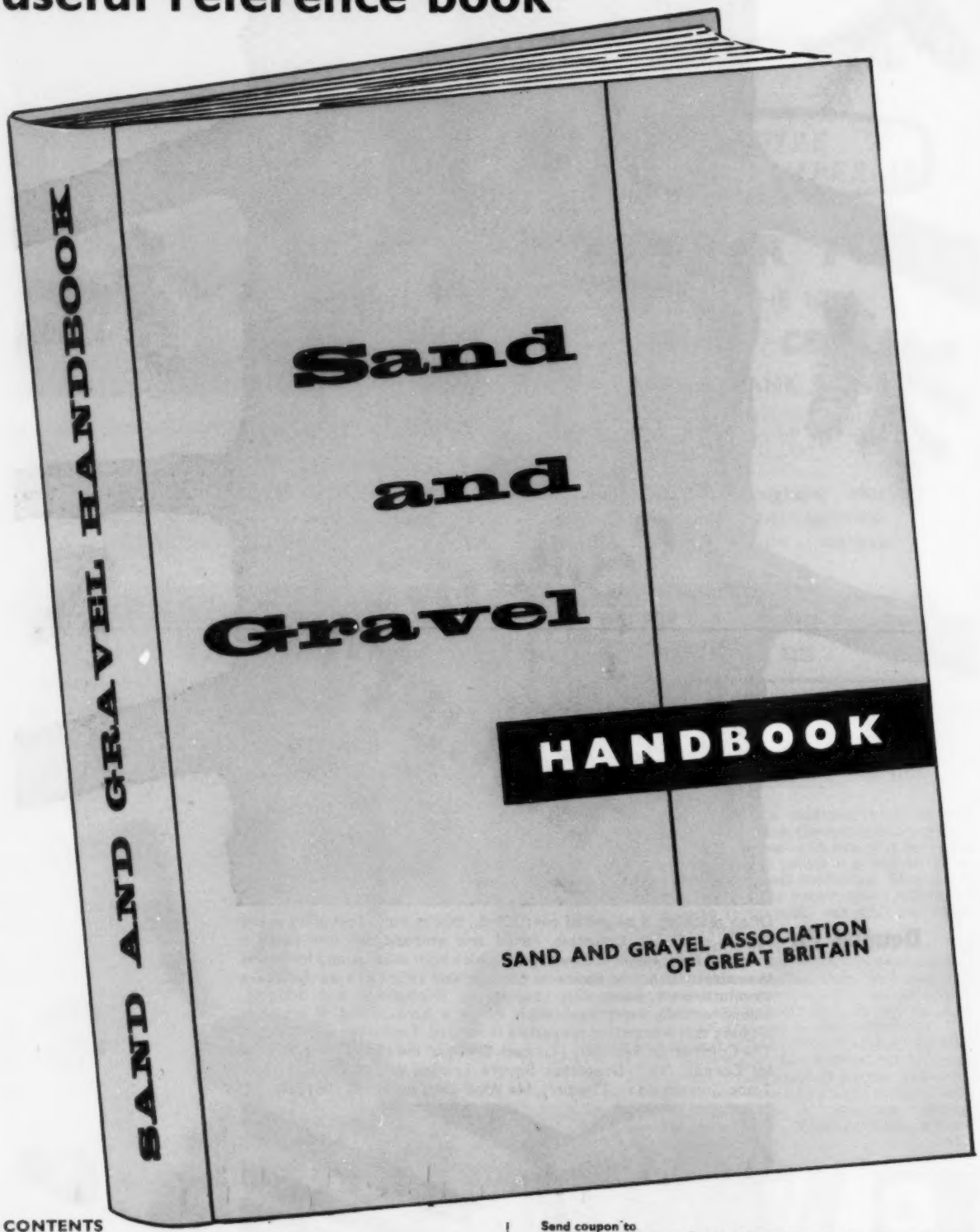

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The Architects' Journal

Volume 134 Number 16 October 18 1961

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NOT QUITE ARCHITECTURE

He must be off his e2

Before you read on, you'd better get hold of that A4 AJ with no addresses on the front—the very week I wanted to write to the British Cast Iron Research Association too — containing THE TABLES; or perhaps flick expertly through your shiny (only) boxfile for AAL; better still lay your Whizzo binder flat on your desk at AAL. Now; are you sitting comfortably?

The advertisement world seems to be so brimming over with ideas of such a uniform mediocrity that it is difficult to sort the chaff from the rubbish. In general, though, this bombardment of high-minded ideas makes it very difficult to detect a trend when it is just a twinkle in a glass of stout, so to speak. However, I believe I have discovered one, a real live trend, and, being a bit reactionary about this effluent society, I don't really want it. I mean the new do-it-yourself, a kiss-for-every-symbol, fill-your-wall-with-200-cardboard-wallets-and-see-how-much-your-architecture-improves, AJ five-year plan, which you MUST have read about. This trend, or neo-trend—they're all a bit neo really; I mean, you used to get a promise over a box of Black Magic from some bird who would write to the newspapers about it. I suppose it was only a promise of meeting mummy but a promise is, as you must have read, a promise—anyway this neo-trend for giving everything a number really begins before pop-art (preserve-me-from), the earliest references I can trace being a nineteenth century music hall ballad entitled *Ne: Old Iron*. This, of course, is now defunct as no-

Too High? Too Late!

These new offices in Arundel Street, Strand, were designed by Arthur Swift & Partners, who worked on the scheme for three years with the clear understanding that the LCC would approve a tall block on this site. Last

week the LCC Planning Committee rejected the scheme and told the architects to provide the same accommodation without building above 100 ft. The RFAC support the LCC because of the proximity of the site to Somerset House. It may be questioned whether a tall block was desirable here, but there can be no justification for such a belated policy switch on the matter—it is the negation of planning; while the instruction to provide the same floor area at a lower height frustrates good design by requiring the substitution of yet another hulking slab block. The architects are taking legal advice as to the financial responsibility for the cost of redesigning the scheme on these new lines. Top, the site from the air; this column, view up Arundel Street from the foot of the tall block; bottom, from across The Strand, with St. Clement Dane in foreground.

body builds in old iron any more, but with Raymond Erith almost at the Industrial Revolution, who knows? (or cares?). ANYWAY the best way to nip a trend in the, so to speak, bud is to expose it to the public gaze before it actually begins to trend.

Thus, there was a time when SFB meant sand-faced-brick and that was that. Now nobody knows what SFB means (send for Banham? Six-hundred filing boxes? Stan Freberg?) but it does mean that with a little diligence you can add a new dimension to your personality. For instance when you get hit by a falling SFB (old style) on site simply exclaim "gl" instead of the usual "cob pisé and adobe!" I used to think they were members of the Design Partnership (it's a 50/50 chance these days. It's another trend). It was not until I saw a book called "Building in Cob, Pisé and Adobe" that I realised that it meant dirt. The book was by EASTWICK-FIELD by the way. This could mean a controversial building for the Choir School and perhaps *another* trend. ANYWAY there you are; clunk—"gl"—exit left, singing I'm a building a (24) to paradise or sous les (vingt-sept) de Paris and you're a new man. Not very nice but new. Off you go into a public (98) for the same protection against the (1) and after a quick (12) tell them to put it on the e5. Now you really are a neo-symbolist. Soon you will be able to refer to John Bratby and k5 Smithson as (73)d7* artists and become a real live fanatic.

The trend will, however, like all good trends, have played itself out, leaving only a wild-eyed group sitting round an A2 size table (which of course, folds into the A4 size to the accompaniment of gasps and then wild cheering, shouts of send for Banham, etc.) There they are sitting and chanting little rhymes about the (98) that Jack built and H. Dumpty sitting on a (21); they get stuck at vinegar and brown paper (you try it VV & LJ4? not a hope) and put their heads in a (54). Astragal calls a d5 and the coast is clear for another trend so watch out Jack. As for me I am adequately provided with DU4.

(*Did you like that? Well, my Mother did. Now I would like to reintroduce traditional values by ending with a song which I hope my Mother will like.*)

Song: (Tune *Crimond* or *Blaze Away*).

YY U R
YY U B
I C U UU SFB**

Postscript

The writer believes in praise where praise is due and therefore acknowledges the great success of the neo-symbolists in their very apt title for the Radio Discussion Programme, (51) Society. They should have hung up their boots while still at the top.

JAMES COLLIER

(*) *Kitchen Zinc* (*ho-ho*).

(**) *Too wise you are, too wise you be, I see you too use* SFB.

The Editors

A QUESTION OF SCALE

The efforts of the Association of Official Architects to establish a simple grading system for architects in local government, and a salary scale which compares with scales of other professions in local government, and with those of architects not in local government, are to be welcomed by everyone concerned either with the status of architects in Britain or with the design of local authority building.

As the report of the AOA's executive (published on p. 653) shows, the present method of grading architects in local government is grotesquely complicated, and has resulted in salary scales which do not compare at all with those of architects working for other, comparable bodies, such as the Civil Service or the BBC.

What is proposed is that only four salary levels should be applied: for the newly-qualified assistant, the experienced job architect, the architect group-leader, and principal architects; and that advancement should be based on ability alone, and "not be limited by fixed establishment."

These proposals are to be discussed with other professional associations in local government, and with NALGO, and it is scarcely necessary to point out that the larger the membership the AOA spokesmen can quote when they come to these discussions the more strength will be behind their case.

Too many architects still regard themselves as in some way above, or at least outside, trade unionism. We have our professional organisation, the RIBA, so what more do we need, they ask. Other professional people have asked the same question, and learnt the need for an organisation to present their claims to decent salaries and conditions, with the strength of numbers behind it.

Some learn the hard way—like the teachers. Architects since the war have been able *not* to learn, the soft way, by leaving local government employment. The lamentable result is constant turnover of staff in local authority architects' departments and growing difficulty in finding men of the right calibre to replace those who leave.

This is a matter to concern everyone who cares about what and how the local authorities build, which must have an infinitely greater effect on the future face of Britain than what the private architect builds. It also cannot but hold back the establishment of an architects' department in every local authority, since those who half-heartedly begin to think it might be better to employ an architect will soon be put off if they can't get a man of the right quality in answer to their advertisements.

The profession as a whole we are sure will welcome the efforts of the AOA to put this right, and the individual architect must play his part by joining the AOA if he is eligible.

DOCTOR IN THE HOUSING

The shake of the ministerial kaleidoscope has brought little pleasure to architects and planners. There is nothing encouraging about the replacement of Henry Brooke (who has learnt quite a lot about housing since he became its Minister) and Sir Keith Joseph, who knew a great deal about building when he started as Henry Brooke's Parliamentary Secretary. By Dr Charles Hill and Geoffrey Rippon. Both have been propagandists for Tory policies and their public sayings have been consistently against planning and public spending ever since they took to politics. Since 1951—when Dr Hill became Tory-Liberal MP in Luton—having won fame as the Radio Doctor by calling a bowel a bowel, neither he nor Mr Rippon has given indications of what they really think should be done about anything—if Press cuttings are reliable evidence.

*

Dr Hill has been Chancellor of the Duchy of Lancaster, Minister of Food (strong anti-rationing stuff) and PMG—but simultaneously in charge of Government publicity. In this last job he was responsible for announcing in 1956, that the resignation of Anthony Eden was a "supremely idiotic fiction" and for telling the Young Conservatives, last October, that "a national housing shortage no longer exists." Mr Ripon, who is mainly distinguished for his youthfulness, was an LCC alderman at 24, one of Henry Brooke's bright young men, and as leader of the Conservatives on the LCC he was necessarily devoted to abusing the Labour majority for extravagance.

*

Dame Evelyn and J. R. James have a tough educational assignment here.

COMING EVENTS

The RIBA's attempts to educate laymen have previously been for the very young—at the Christmas lectures. It was bright of someone to think of organising a series for the older *non* architects. The three lectures on "Modern Architecture: Yesterday, Today and Tomorrow," to be given at 66 Portland Place by R. Furneaux Jordan, are designed to interest laymen in their environment and give them insight into what architects are trying to do. Obviously this is the place to send your new client. The lectures are on November 15, 22 and 29, at 6.0.

*

Another RIBA lecture I certainly shan't miss is Elizabeth Layton, who is talking on November 7 about "New Strategies for Local Authority Building." If you have read her book on building by local authorities you will not need prompting to go and hear her. But to avoid, as they say, disappointment you'll have to turn up early to beat the expected rush of local government representatives.

*

The AA too has produced a lively winter programme. Dr Gropius will be at the dinner on November 8, Jane Drew will describe America on November 15, Professor Pevsner and Dr Banham will open a discussion after an "informal dinner" on December 7, and there will be an exhibition of those strange, complicated, beautiful and well-planned Christmas cards peculiar to architects from December 11.

EASIER SAID THAN DON

In the current issue of *Universities Quarterly*, which asks if the modern universities can make themselves more attractive "to the young and to their advisers in the schools," Sir Charles Morris, Vice-Chancellor of Leeds, speaks of the need for better architecture in them. "They *ought*," he says, "to be given the resources to make themselves great universities, with the way of life of great universities. The architects and planners of this generation can, I am sure, do this for them. I hope they may be given the chance."

*

This is a welcome change from the academic attitudes which the now-famous issue of the *Architectural Review* complained about four years ago. In my own mind there lingers one churlish doubt. Are Sir Charles and his fellow dons still thinking of "prestige" architecture as an extension of Public Relations, or are they at last beginning to realise that well-designed buildings are an essential tool in education and not merely a glorious backdrop?

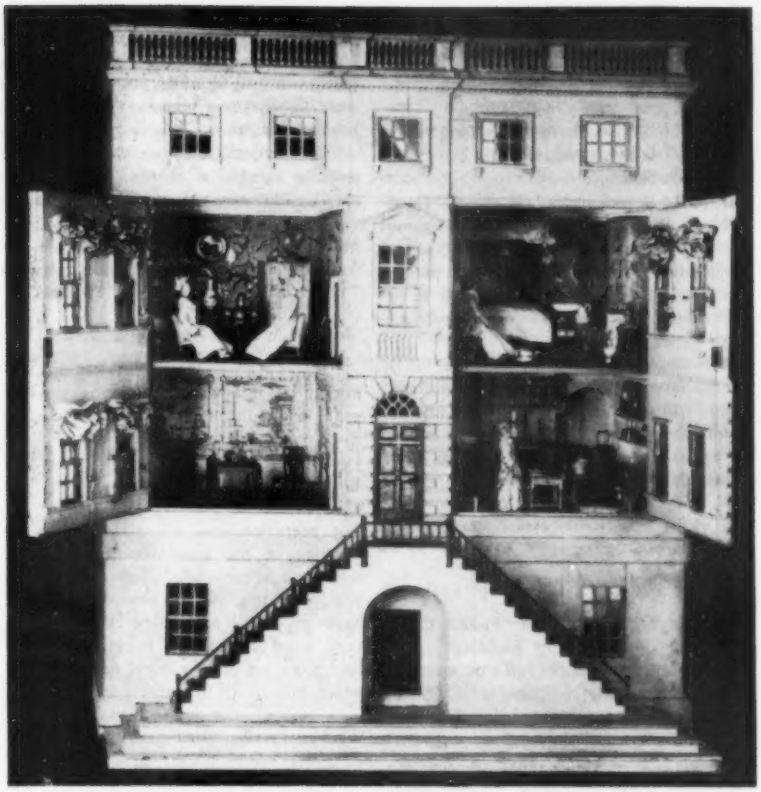
GAUDI ON TELLY

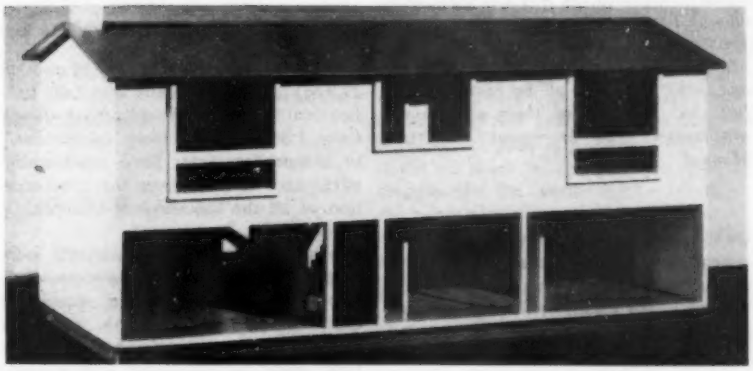
While the squares were watching *Monitor* last Sunday and groaning that it never does anything about architecture, irresponsible viewers on the other Channel were treated to something of an architectural joke. Alun Owen's entertaining and literate fantasy, *The Rose Affair*, included numerous scenes aparently filmed in different Gaudi buildings in Barcelona (and against the spires of the Sagrada Familia), an hour-long impersonation of J*h* B*tj*m*n by Naunton Wayne, and a comic manservant who appeared in a number of guises, one of them suspiciously like the Earl of Sn*wdon. This was not, however, billed as of interest to architects; but presumably the producer and designer must have known that architects would relish the joke. Will they please let the architectural papers know in good time on another occasion? Watch out for other work by the designer, Voytek.

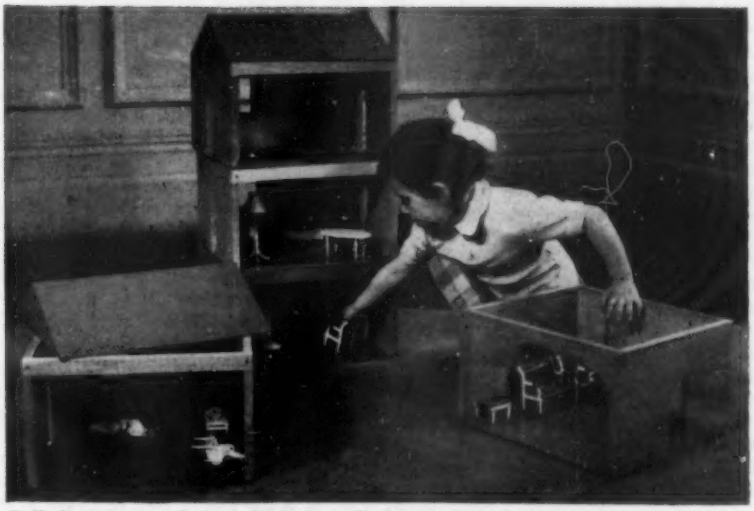
HOUSING LAGS AGAIN

Looking for the refurbished Rowton House near King's Cross I met a man just out of prison that morning, who already knew that it had become the Mount Pleasant Hotel.

The demand for shilling-a-night cubicles and breakfast which Rowton Houses provided has fallen







Dolls houses: . . . Eighteenth century splendour, now in the London Museum; modern austerity; below, flexibility with rooms for stacking or spreading.

off, so this stark, massive building—unchanged outside apart from an autumn clean and a new entrance that is out of scale—will house a different class of resident, providing comfortable and cheap accommodation for students, foreign visitors and junior executives.

*

The alterations, designed by Ley, Colbeck & Partners for £30,000, have produced an atmosphere of you've-never-had-it - so - good amid solid nineteenth century brickwork spanned by filler joists. Single bed-sitters, with pleasant furniture, electric heater, wireless speaker and internal telephone, have replaced the cubicles. Here a single person can get a week's B and B for £6 6s. Full pension for a couple is £20 6s. The hotel is already full, but where will the old lags go?

SPEC BUILT FOR DOLLS

A nasty villadom can be created in the nursery from post-war, mass-produced dolls' houses, so the news that Anne Swain and Michael Brownson had designed a house for Abbatts Toys cheered quite a few architect-parents. Alas, the result, though neat and not nasty, is austere enough for a local authority up against the bank rate, and the luxury price is 18 guineas. This works out at about the same price per square foot of floor area as a real house—and without anything for foundations or services! The price would come down with a long production run, but can we expect such a run at this price? After all, the blank front wall, broken only by a door and first-storey central window, might suit a hate-your-neighbours patio-dweller, but would it attract a child? As for the glazed (perspex) back wall—this provides none of the useful space for wallpaper, pictures, mantelpieces and other bric-a-brac which make playing with a dolls' house enjoyable.

*

A better buy is the flexible house to be found at James Galt's new toy shop in Great Marlborough Street. This is made of separate rooms which can be piled up as houses or flats, or used separately with separate pitched roofs. The rooms are 22s 6d each, the roofs, 5s 3d.

ASTRAGAL

LETTERS

Paul Mutimer, student

Malcolm F. Last, student

Cecil C. Handisyde
AADipl, ARIBA

Stanley Meyrick
Dipl Arch, ARIBA

Alex J. Gordon, Dipl Arch, ARIBA

K. W. Busby

Adrian Heath, AADipl ARIBA

John Arden

John Ollis, AADipl, ARIBA

SfB

SIR: Firstly may I heartily commend you on your new series of articles: they are excellent, well set out and easy to consult. There are, however, two small things I would like to point out for improvement.

First, the AJ Product File of the small cut-out sheets. I should imagine that your aim is to produce a system similar to the Architectural Design Products Film; is it not possible, therefore, to make these pages of a stiffer paper, or card, using both sides for information data? The reason why I suggest this is that these paper sheets will become tatty in a short time, after they have been thumbed through for information. Also, the space on the back of these product files seems to be wasted with a quarter of an advertisement each: is it not possible to use this space for information or details?

Secondly, would it be possible to do the Working Detail sheets on the stiffer paper, as you used to do? Please accept these points as suggestions and not complaints.

I believe also that there has been a printing error on the cover of the AJ of October 4: It reads Volume 134 No 12; I believe this should be No 14.

PAUL MUTIMER

Maidstone, Kent

We are grateful to Mr Mutimer for his comments. We went into the matter very carefully, and found that, with the increased size of the AJ, it would no longer be possible, for technical reasons, to put all the filable sections of the AJ onto stiffer paper. With regard to the criticism of the Products File, this is intended only to be a quick reference to the latest products on the market. In the long term the more important products will be covered by Information Sheets. We regret the misprint of the AJ Number for October 4. Volume 134, No 14 is correct. —THE EDITORS.

SIR: Three cheers for the new SfB/UDC main tables, especially for clarifying Sections A and B.

No, make it two-and-a-half cheers. Once again, I have looked in vain for a home for that Cinderella of building types—the public convenience. Is it a (92) public building—waterworks? Or could it be a (94) health and welfare building—hospice or institution?

What about classifying it under (95) entertainment and recreation buildings (with sub-division 725.98 large underground halls and spaces)? Surely it is not to be exiled to 728.9 outbuildings and sheds—not a PUBLIC convenience.

Will Mr Bullivant please oblige?

MALCOLM F. LAST

Nottingham

DARGAN BULLIVANT *replies: Public Conveniences, considered as building types, come under* (92), *and the full* UDC *number is* 725.194.4. *Using this case as a precedent for similar queries, I would comment that there are hundreds of different building types which have a specific name. The Building Filing Manual only contains a limited list, which is quite long enough for normal purposes. If in doubt, specific types which are not in the Manual, such as guild halls, bazaars and army huts, can all be found in the full* UDC *Tables, and their appropriate* SfB *number can be found from the Manual.*

SIR: Having changed our office filing system to SfB we inevitably find some difficulty in deciding where to place certain items, for example, whether a metal sheeting used as cladding should go under elements or materials. There must already be a considerable number of items of this kind and it seems that the decisions should be taken by the user-filer.

A difficulty appears to be arising because some manufacturers, who have kept in touch with the SfB development, are now issuing their information with an SfB reference printed on. Very desirable in theory but confusing in practice since such material is very liable to be filed under the manufacturer's heading without further thought.

A recent example is in fact of a metal cladding system which we consider should have a building element description but which the manufacturer has thought of as a "material" and referenced accordingly. It would seem that a space for the reference to be inserted would be more sensible than having the reference itself printed in.

Is this difficulty being experienced by others?

CECIL C. HANDISYDE

London, WC1

We think it is best for manufacturers to pre-classify their trade literature. If, however, a manufacturer chooses to put a constructional heading on his literature and the architect considers that a functional element heading would be more useful, then it is open to the architect to add the functional element heading as a prefix. The case of the metal cladding system seems a mis-classification, since this product could only be used in one building element. No item should have a "materials" tag only.—THE EDITORS.

SIR: I hesitate to beg even the smallest space in a Journal now so tightly packed with really useful material, but I hope you will be able to find room for a very short letter of appreciation of what you have done.

For years we have all talked about the urgency of the need for a fool-proof reference system for information. Now you have not merely provided it. You have produced something which has a very good chance of becoming damn-fool-proof—a great achievement and one which puts us all immensely in your debt.

STANLEY MEYRICK

Welwyn Garden City

Design team working

SIR: While agreeing with Mr Munce (AJ 27.9.61) on the importance of a fully professional and closely integrated design team, I believe that "loose associations" of independent firms have considerable advantages to offer over the concentration of all the specialists in one organisation.

For each scheme the most suitable independent consultants can be appointed, bringing to that scheme a wealth of experience gained elsewhere. One can work with specialists of a higher calibre than could be supported within one's own organisation unless it was of very considerable size.

Further, although mutual respect and good communications are essential for effective design team working, an element of tension which keeps everybody on their toes can benefit the job and the client.

Such conditions are more likely to be found in the loosely knit design team.

ALEX GORDON

Cardiff

Certificate procedure

SIR: Your issue for September 20 contained the inaccuracy that certificate procedure is based on claims prepared by contractors from cost data.

The onus of preparing a valuation, at least in those cases where there is a QS drawing a fee for the service, is on the

QS who, if conscientious, will act on the contract and value the work properly executed (standard form, condition 24(b)'. This will invariably differ from the contractor's costs, which at best should be used only as a rough guide to the correctness of the valuation.

K. W. BUSBY

London, W1

Quite Knott for Architects

SIR: It seems a pity that in the AJ of September 20 London's best furniture exhibition for a very, very long time should have been described so superficially. Specially so since Børge Mogensen's designs are particularly architectural in character and satisfy the urge so many of us now have, to use and have around us good, natural materials.

Far from being an exhibition, as ASTRAGAL says (and it's alright, I know he said it just to be chatty but it is irritating when it confuses an important issue) "for those of you who are interested in the Higher Commercialism . . ." this was, in fact, something to see for those of us who are interested in the high art of making simple, honest constructions in wood, where every detail is just right (and no more) to form practical and likeable pieces of furniture.

I would have thought that this was something which architects and manufacturers, in this of all fields, need to study very carefully in England.

ADRIAN HEATH

Valby, Denmark

"Wet Fish"

SIR: I have only just been shown your edition of September 13 1961, with the comment upon my TV play "Wet Fish." I am sorry if your contributor found it a silly play, and indeed perhaps it was: but even so I think he has fallen into the not uncommon error of expecting the invention of comedy to coincide with the reportage of documentary. (The production of "Wet Fish," with which I had nothing whatever to do, may have encouraged him in this confusion, because it certainly did suggest the documentary drama in its style.)

It is by no means unprecedented for social criticism to be conveyed in plays by means of exaggeration and farcical caricature, both in situation and character: and the exact relationship of this exaggeration to the reality that inspires it is naturally delicate and subject to misjudgment. But I do not think my architect and his office were portrayed with any less truth than, say, Mr. Pecksniff and *his* in "Martin Chuzzlewit"—and Dickens' technique of comic enlargement is now generally accepted as a valid artistic convention.

As a matter of fact, I *have* heard of an architect's office where an assistant ran a brothel on the side, and where the principals kept dashing off leaving incompetent assistants in charge of jobs. About seductions during building inspections I cannot speak from personal experience, but I fancy they can happen anywhere? In this particular office they were said to take place on the roof during the lunch break.

If I say that all architects' offices are really odd places indeed, I am sure you will do your best (from the PRO angle, which is now so important to the profession) to persuade the world that they are not—but nevertheless they are, and I suspect the reason is that architects by and large have never been able to make up their minds whether they are artists or business-men or scientists or technicians.

There is no such thing as the *typical* office: and therefore my failure to present it in a play can hardly in justice be held against me.

JOHN ARDEN

Stamford Bridge,
York.

Avoiding world disaster

SIR: May I urge those members of the profession who feel, as I do, that our whole future as human beings and as effective architects is being threatened by stupid politicians, to join one of the political parties?

The teaching profession is doing this on a massive scale. If other professions follow suit, this could be a wonderful influence for good in our public life, and might do much to avoid disaster to the country and the world and to secure a more promising future.

JOHN OLLIS

Bristol

Diary

Domestic Heating and Insulation in the Home Exhibition: Free Trade Hall, Manchester. OCTOBER 19 TO 22

Housing for the disabled: Lecture by Lady Hamilton, the Housing Centre, at 6.0 pm. OCTOBER 24

Standards and Values in Motor Age Towns: C. D. Buchanan gives the triennial Rees Jeffreys lecture for the TPI, Henry Jarvis Hall, 66 Portland Place, at 6 pm. OCTOBER 26

LMBA *lecture on the Common Market:* Royal Institution of Chartered Surveyors, at 6.30 pm. OCTOBER 31

Design from Sweden: Exhibition at the Design Centre, Haymarket, London, SW1. UNTIL NOVEMBER 4

NEWS

Official architects launch salaries campaign

The Executive of the Association of Official Architects has prepared a paper on the salaries and grading of architects in local government, which it is circulating to other professional associations in local government, as a basis, it is hoped, for discussion at a joint meeting later this year.

At the last annual general meeting of the AOA there was unanimous agreement on the need for separate negotiations for professions, and on the salary levels for architects put forward.

NALGO has now been informed that the AOA has taken over the work of the former Salaried and Official Architects Committee of the RIBA, and is also being invited to come in on discussions.

The document on salaries and grading is as follows:

1. Architects in local government below the rank of deputy chief officer are placed either on the APT grades III to V or within the lettered JNC grades. The present scales are:—

APT	III	£960-£1160	
	IV	£1140-£1310	
	V	£1310-£1480	as from 1.9.60
JNC	A	£1565	max
	B	£1670	max
	C	£1560-£1825	
	D	£1710-£1975	
	E	£1860-£2120	
	F	£2015-£2345	
	G	£2240-£2565	
	H	£2470-£2785	
	I	£2615-£2935	as from 1.10.60

These rates include London weighting.

2. The NJC Scheme of Conditions of Service lays down that—"Posts occupied by assistants who are required to have passed part 1 and 2 of the RIBA Final or Special Final examination or the equivalent at one of the recognised schools of architecture and to have had at least five years' experience (including the period spent on theoretical training)," should be graded within APT III, III/IV or IV at the discretion of the employing authority.

"The grading of posts which carry duties of a more responsible character is left to employing authorities."

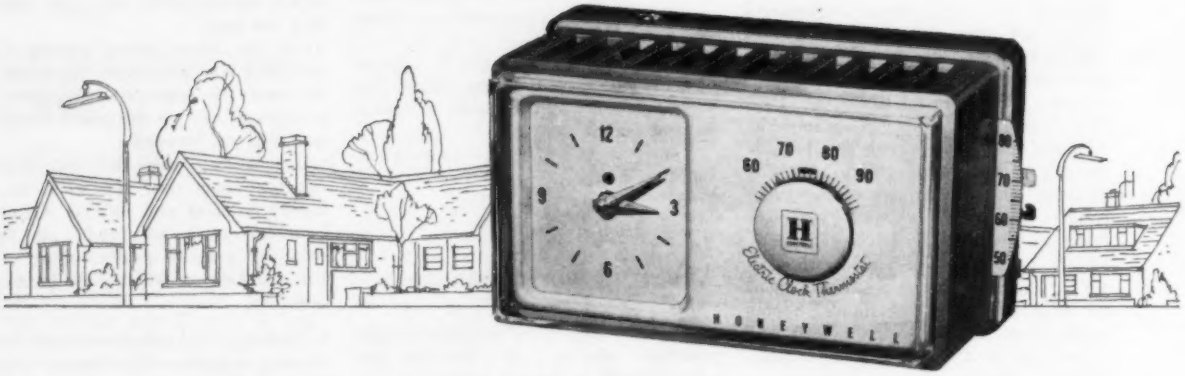
3. In an article in the RIBA *Journal* for January 1961 analysing the returns of a number of city and borough architects' departments, with a total staff of 757 qualified architects, only 85 or 11·2 per cent were on "lettered" grades.

4. In a recent survey carried out by the RIBA covering 80 per cent of all local

another 1,000

Honeywell Clock Thermostats

for Hallmark Homes



Mr. Leslie Draycott of Messrs. A. C. Draycott, Principal Agents for Hallmark Homes, has demonstrated his belief that Honeywell Electric Clock Thermostats are a saleable asset in modern homes by specifying them for all their new bungalows and houses. More than a thousand will be installed in the next two years.

The Honeywell Clock Thermostat gives the home-owner the most economical control of central heating yet devised. It turns heat down at night and up again in the morning —automatically saving fuel.

Builders and heating engineers are specifying Honeywell Clock Thermostats for other good reasons. They appreciate the comprehensive installation instructions, the product advertising campaigns and the full after-sales service available from ten branch offices throughout the country. To obtain literature on Honeywell Thermostats and Honeywell Service please complete and post the coupon today.

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authority architects' departments the median salary of all architects employed at age 20-29 was £1150; at age 30-34, £1275; at age 35-59, £1350, or grades III, IV, and V respectively. One-quarter of all architects in the same age groups received £1200, £1350 and £1550 respectively.

5. Whatever the field of employment, work, carried out by architects is comparable and the salaries and conditions in local authorities at the present moment can be judged by setting them against other public employers.

6. *Civil Service*

Basic Grade	£991-£1490
Main Grade	£1516-£2015
Senior Grade	£2145-£2457
including London weighting	

Hospital Boards

Assistant Architects	£945-£1360
Senior Assistant Architects	£1350-£1650
Prin. Assistant Architects	£1,715-£2085
Prin. Assistant Architects including London weighting	£1815-£2185

BBC

Assistant Architect	£1225-£1780
Architect	£1830-£2000
Senior Architect	£2265-£2475

National Coal Board

Architects	£900-£1250
Senior Architects	£1145-£1700
Divisional Architects	£2100-£2900

7. It should be noted that the present salary scales of the Civil Service and the hospital boards have been determined by independent tribunals. It is also worth noting that where any of the above authorities employ private architects the same scale of fees will form the basis of payment, whatever the circumstances. Even in housing, since June 1 this year the full scale of fees is required from local authorities. But despite this a group leader in local government at best will be on Grade D with a maximum of £1975, but more probably on Grade V, maximum £1480.

8. The AOA believes that incorporation within the National Joint Council of the former JNC 'lettered' grades should provide the opportunity for a review of the whole grade structure of architects in local government. . . .

Local authorities are meeting extreme difficulties in recruiting and maintaining staff. In the RIBA *Journal* . . . it was shown that out of 757 positions 88 were unfilled. One of the factors that deters architects is the multiplicity of grades. The present structure of 12 grades bears no relation to the duties performed or responsibilities held. On the contrary they are a deterrent to any increase in output from the offices. A rigid hierarchy of grades, with a fixed establishment, only prevents the architect from exercising his abilities and knowledge beyond the responsibilities laid down.

Architecture and good building are the product of team work and any staff structure should express this and allow the architect to carry to maximum of responsibility of which he is capable.

9. There is a need for no more than four levels to be recognised in any grade structure:

(A) the newly-qualified assistant gaining experience

(B) the experienced architect capable of supervising any individual job

(C) the architect who, as group leader, is responsible for a team and a defined programme of work

(D) the supervisory position where there is a need for an architect between the deputy and group leader.

It is important that advance from A to B should be on ability alone and not be limited by any fixed establishment. For this reason the AOA recommends the following structure:

Architect	£1000-£1500
	£1500-£2000
Senior Architect	£2000-£2300
	£2300-£2500
Principal Architect, deputy and chief officer	£2500-£3000

It will be seen that the scales proposed are almost entirely contained within the limits of those at present in existence. . . . They do no more than relate a grade structure to the practice o foffice organisation and recognise the need to relate remuneration to the general standards of the profession.

Approach to MOH

The AOA is also seeking representation on the staff side of the committee of the Whitley Councils for the Health Services, and is petitioning the Minister of Health for this. At present the staff side of the committee consists of six NALGO representatives and six members drawn from the Association of Building Technicians, the Association of Supervisory Staffs, the Confederation of Health Service Employees, the National Union of Public Employees, the Institution of Engineers-in-Charge and the Institution of Hospital Engineers.

To strengthen its case for representation of hospital architects, the AOA must be able to convince the Minister that it represents the majority of architects of regional hospital board staffs, and is appealing to all hospital architects to join the Association without delay to enable it to speak for them with full authority.

IHVE

Future trends in heating and air conditioning

That electricity will eventually be the main source of energy for space heating, superseding coal, gas and oil, was the unanimous opinion of delegates to the International Conference on Heating, Ventilating and Air Conditioning organised by the Institution of Heating and Ventilating Engineers at Olympia from September 27 to October 4. It was attended by delegates from 24 countries, and it concentrated on three major themes: the next decade, training and education, and the integration of engineering services with architecture and town planning.

Discussion of the various sources of energy for space heating in the future provoked consideration of fossil fueled power stations and the question whether these were still a proposition when their overall efficiency is only in the region of 26 per cent. It was argued that it was not in the national interest to consume coal at 26 per cent efficiency when it was possible to consume it at an efficiency of 80 per cent in separate heating plants. But it was shown that if the labour and transport used for delivery and ash removal were taken into account, and the fact that fossil fuels suitable for power station firing are not always suited to small plant boilers, the power station was still worth consideration.

The main question here was when would electricity be available to do the job: it was agreed that the UK is in a unique position, owing to the development here of nuclear power, and the increasing use of electricity for space heating by the thermal storage method: experience in these fields is in advance of most other European countries.

In the immediate future delegates thought that the use of solid fuels would decline rapidly, to be superseded first by oil, then by gas—but not the town gas produced from coal today. In the USA it is already cheaper in some areas to use natural gas than oil, and more convenient, as no storage or transportation is involved. There has been a rapid increase in the tapping of natural gas deposits and a vast network of distribution mains is being built. Britain has no natural gas deposits, but already distribution mains are being laid from the gas deposits in the Sahara across the Straits of Gibraltar to Europe, and it was forecast that within the next decade most of Europe will be connected to natural gas supplies, with a pipeline across the Channel as a possibility. Natural gas is already being imported in special refrigerated ships. The aim is to produce a gas of high calorific value and sent out under higher pressures than at present: such a fuel would be comparable with the price of imported oil, and in that case gas installations may become more numerous than oil.

An immediate growth of electricity for stored space heating, owing to the Off-Peak tariff, was forecast, but only as an interim stage, as investigations have already shown that the intermittent heating of buildings by on-peak electricity is often more economic and certainly more comfortable, though there is some oppo-

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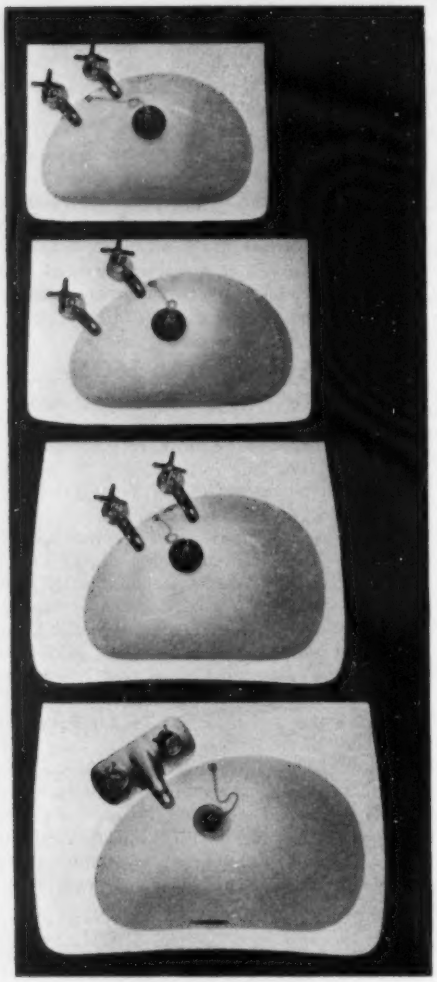

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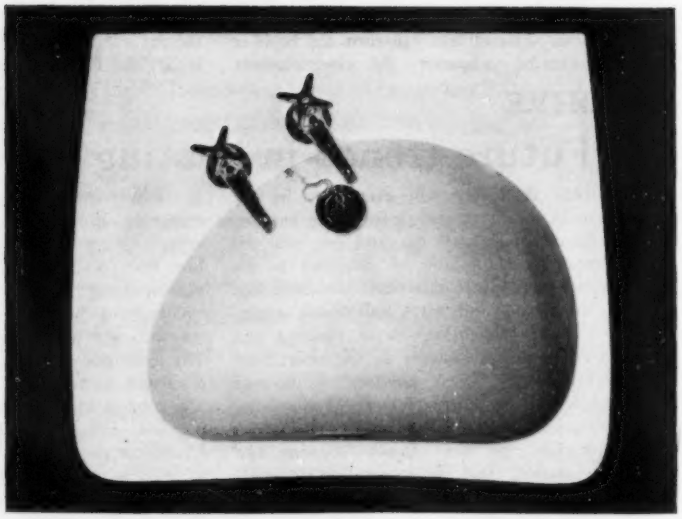

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sition to this trend by the generating boards, who naturally wish to increase their base load and not their peak load. Architects were urged to consider carefully the thermal characteristics of the buildings now on their drawing boards, which will possibly be still in use in AD 2000, and to create conditions suitable for intermittent heating, since this is the aim, whatever the fuel in use. This would require a fairly massive shell, or one at least with a high degree of climatic modification, with thermal insulation as near the interior as possible, for a quick response of the internal surface temperatures to changes in air temperature. Large areas of glazing should be avoided, and adequate sun screening should be provided, and more consideration given to orientation of buildings.

The commonest heat transfer media have been water and steam, but today air is increasily used for this purpose, and with the growing demand for thermal comfort in buildings air duct systems are demanding too much space, which has resulted, in the USA, in the development of high pressure air-conditioning systems. It was the general opinion that air as a heat transfer medium will gradually be replaced by fluids, which if accelerated to higher velocities can use smaller pipes. By this method, heat and cold could be distributed from a central plant of moderate size to individual rooms. Such a unit would not serve more than 10 floors of a tower block, so larger buildings would be sub-divided into a number of unit plants. Eventually it may be possible to develop a fluid that would condense in the room unit in winter to give off heat, and evaporate in summer to extract heat, using only one pipe line. Considerable changes were forecast in the next 10 years, in fuels and heat transfer media used, and it was urged that manufacturers of heating and cooling equipment should study the problems of mass production of unit types of plant with a shorter life than at present, so that it would not be too costly to replace present plant with new, more economic and comfortable systems which will become available.

Delegates in fact considered that the days of the radiator are already numbered: the trend is towards intermittent, fast-reacting systems with individual controls. The use of convectors, either natural or fan blown, will therefore increase, as well as the use of full air conditioning, not only because of the increased comfort, but for the saving in interior maintenance costs, and the achievement of acoustic insulation. At present the source is likely to be ducted air, but piped hot and cold fluids to room conditioner units will be the next step, followed by electric heating elements plus piped coolant. Other factors, such as lighter buildings which allow increased solar heat penetration, and increasing levels of artificial illumination will also stimulate the increase of air conditioning.

Electricity Boards should prepare for this increased demand for space heating purposes, but also—if the USA is any guide—for cooling purposes. So it is a question not only of adding to the peak load but also to the base load.

The theme of the relationship between the heating, ventilating and air conditioning engineer and the architect and town planner, brought into the open the lack of understanding that exists at present. There was a general complaint that the engineer is not consulted soon enough in the development of a project and that architects are not usually very much interested in the climatic modification characteristics of their buildings. The paper on town planning brought out that the micro-climatic aspects of urban planning are often forgotten, that due attention had to be paid to the plan shapes of buildings so that excessive areas of facade with unsatisfactory orientation do not occur, and that the external surface area in relation to floor area be kept as low as possible. Design of buildings ought to take into account not only thermal insulation but acoustic and visual comfort also, it was pointed out, and the siting of buildings to achieve these conditions was an essential part of urban planning.

The organisation of a comprehensive design team and the role of the architect provoked some disagreement, but the conference recognised that the present trend to specialisation has resulted in too many people working in isolation. In a team of specialists working together, however, the problem was posed whether the architect was the person to make all decisions and direct the team, or whether he was to act as co-ordinator, taking the advice of specialists—who often had pet theories.

Integrated design was the subject of two papers, from Poland and the USA. Both brought out the necessity for close architectural collaboration if satisfactory installations were to be achieved, and the necessity for investigation of various alternative solutions for a given problem to find definite evidence why a particular solution should be chosen. It was felt that such investigations could only be satisfactorily carried out by an independent consultant, whose cost was usually saved by the choosing of the most economic system—not necessarily the cheapest in first cost, but when the first cost plus running, maintenance costs and amortisation were taken into account. Examples were given of the considerable variation of installation costs in similar buildings which could result from the architect not having considered the role of the building itself in providing conditions that would keep plant costs down. This sort of thing could be avoided if a consultant were brought in at an early stage, for it is often in the preliminary stages that wrong decisions are made, on siting and orientation for instance. The Polish paper gave considerable data on the design of installations for flats of different plan form and construction.

Two papers, by architect A. J. Gordon on the relationship between architect and engineer, and by Professor Page of Sheffield on the scientific approach led to discussion of the problem of the education of each profession to understand the role of the other. Collaboration on design projects for architects with heating and ventilation engineers was proposed, or at least some common lectures during their first year.

All the papers given at the conference, including those on hospital installations, not mentioned here, will be available later in book form, published by the IHVE.

LEWIS MUMFORD AND THE CITY

A Review of "The City in History" by Lewis Mumford (Secker & Warburg, 70s.) by Percy Johnson Marshall.

Lewis Mumford has put us in his debt many times, whether we are architects, city designers, regional developers, or merely honest citizens. Whatever we are, we should be worried about so many destructive influences at work in our society, puzzled about the failure of all the other citizens to accept regional, urban or architectural proposals, or just desperately frustrated that all the incredible new scientific discoveries of the last two centuries somehow cannot be used in a co-ordinated way for the general good of man and the environment.

Thus, when a man of Mumford's outstanding mind, incomparable depth and breadth of learning, and boldly progressive humanist views, re-writes one of the most vital books of our time after twenty-three years, it behoves us all—that is all of us first as citizens—to read, re-read and digest it slowly over a period. For this is no mere work of re-editing, and the present book in no wise renders "The Culture of Cities" redundant. As Mumford says in his preface, "I have kept only so much as I was not skilful enough to improve or resourceful enough to expand. The material thus retained should give the book an organic continuity and solidity that would have been lacking, perhaps, had I ignored the earlier structure and, like a speculative builder with a bulldozer, levelled the whole tract. In this it reflects with symbolic aptness the historic growth of the city itself." This is of course a vast understatement, since

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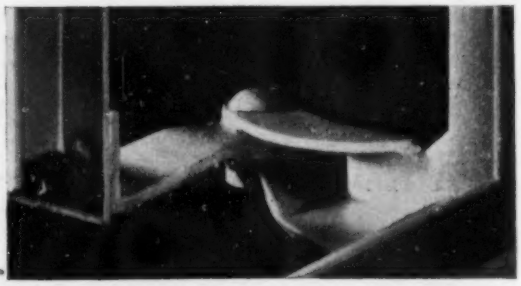

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in his full maturity he is as skilful and resourceful as any man living, or at least any man who dares to commit himself on such a broad range of knowledge. But it does relate very well the two great works with a nice urban parallel.

When I first read "The Culture of Cities" just before the War it took months to get through, and when finally I reached the bibliography at the end there was almost another book, like a Shaw play and preface in reverse. At the time I thought "could he really have read all this when it took me so long just to read this one book?" I have met Lewis Mumford a number of times in the intervening period, and have visited him in his delightful home at Amenia. Significantly the walls of this modern New England farmhouse are lined with books, which are certainly not there for heat insulation, indeed they are the books of all the bibliographies and more, and anyone who has had any serious discussions with him must realise that his learning alone is prodigious, accompanied as it is by an extraordinarily retentive memory.

Perhaps my criticism is that he has if anything tried to encompass too much in one volume. I had hoped that when he came to rewrite "The Culture of Cities" he would keep the same time scale, that is of the last thousand years, and through his ever widening range of reading and travel, coupled with the quite exceptional events that have taken place in the planning world, and have given us both background and foreground, region and courtyard, mass and individual, that only he, as yesterday's follower of Geddes and today's guide for us all, could give.

But he likes to see things as whole entities, and the evolution of urban man knows no historian's convenience in truncating the sum total of urban experience. Like most of us too he was fascinated by the archaeologists' search back into origins and the constant recurring question of "how did it begin?" So he begins by going deep into the Gordon Childe country, to the lands of Woolley and Mortimer Wheeler and Schliemann, and superb reading it is. Here, as though taking us up to a high mountain in time, he tempts us with facts, ideas, theories, and lessons. At each stage he discusses the evolution of towns and cities against the political, economic and social conditions that produced them. For good measure we are given the planners' theories of the time, of thinkers like Plato and Aristotle, of planners like Alchenaton, Hippodamus, and Vitruvius; with the limitation of their ideas made clear at each stage. Later we have a description of More's Utopia, set against its transitional background between decaying mediæval and recent Renaissance cultures. And so right down to today we have the story of the growth of towns and cities seen in the context of the people who, often only half knowingly, made them.

In recommending this book to all planners and architects and their clients, and saying that it is an essential part of their reading, one invites the obvious question, about an expensive book from at least the two underpaid professions.

First then, here is a philosopher of our time who has consistently written about architecture and urban planning, and who has it, so to speak, in his blood. But he also has a deep regard for people—our clients—and everything he writes is an attempt to give us the "why" of our physical environment. Too many architectural students receive a much too superficial education in client needs and in the understanding of why buildings and towns look as they do. Although, for instance, Mumford spends if anything too much time on the Garden City Movement, he does at least put it in its world context. While in Britain we tend to be too derogatory about our garden suburbs and New Towns, and Mumford, who is quite clear about their limitations, takes a whole chapter to analyse the movement. He ties it in superbly with the overgrown city and its corollary, the over compensating motorways. The last few chapters contain a series of extremely important observations about urbanism and the future of cities, particularly in relation to the primitive accumulation of vast numbers of people, and his section on the invisible city, makes clear how an intelligent use of all forms of communication could go far to change the nature of the problem, instead of always trying to resolve an impossible set of conditions, as most of us seem to be fated to do.

To conclude, this book is the fruit of a life-long study of cities, and is a milestone in our way to a full understanding of cities and the people who live in them. It is well printed, contains the usual generous collection of illustrations to help us through its complex tale, and has an excellent bibliography. One hopes that it will soon be reprinted in a cheap edition, even as a paperback, for it is a great work of civilisation in itself and should be available to all who seek after the betterment of man.

Corrosion of aluminium bungalows

The Ministry of Housing and Local Government announce that corrosion discovered some time ago in the Ministry's Type B2 aluminium bungalow has been investigated by BRS and has been found incurable.

13,400 of these bungalows were built by local authorities between the years 1949 and 1951. They were regarded as permanent, not temporary, and were supposed to have a life of 60 years. The cause of their failure after only 10 years of life is the fact that they were built of a high strength aluminum alloy which contains copper and which is liable to laminar corrosion.

The Ministry is planning to recompense those authorities who have had to suffer this disappointment.

The Aluminium Development Association later issued a defence of aluminium as a building material, and pointed out that the 70,000 prefabricated aluminium bungalows which went up after the war were the result of a conjunction of acute housing shortage with "the threat of enforced idleness of men and machines in the aircraft factories." "This and the ready availability of large tonnages of scrap aluminium alloys from crashed aircraft . . . led the aircraft industry and the aluminium industry to propose that a pre-fabricated bungalow should be designed for mass production in aircraft factories." Of 70,000 bungalows ordered. 15,000 of the same construction were to be modified to give them "permanent life," by painting the structural members, which could not be given the thin coating of pure aluminium which protected the cladding sheets.

In the event some of the "temporary" bungalows have "exceeded their stipulated life," while the paint protection of the "permanent" ones proved insufficient. The only question, unanswered seems to be "Why?"

YORK INSTITUTE

New director

Patrick Nuttgens, at present on the staff of the department of architecture, Edinburgh University, has been appointed director of the York Institute of Advanced Architectural Studies, the post which has been vacant since the death of Dr W. A. Singleton 18 months ago. William Allen, who has been acting as adviser to the IAAS during this period, will relinquish this position when Patrick Nuttgens takes up his post at the end of the year. In the meantime Geoffrey Broadbent, previously of the school of architecture at Manchester University, has just started work as the new secretary of the IAAS, to replace J. P. West-Taylor, who is now registrar of the embryonic York University.

Fire escapes not good enough

The LCC has been carrying through an experimental programme of inspection of the means of escape in areas of high fire risk, and the alarming fact was revealed at last month's Council Meeting that out of 2,400 buildings surveyed, better means of escape and fire precautions had to be stipulated in 1,770 cases. Improvements have been carried out in 780 of these. The survey has been accompanied by a publicity campaign on the subject.

Photograph by courtesy of King's College

Library Extension—King's College, Newcastle
Architects: Easton and Robertson, Cusdin, Preston and Smith

the architects' journal
supplement on

architectural education

a new course in the theory and practice of building at nottingham school of architecture

by paul ritter

traditional course

"Thought is born of failure." The traditional course in Building Construction failed in Nottingham, as it does in all other Schools, on several counts. These are:

1. *Lectures*
The increasing volume of knowledge cannot be covered in courses of lectures during the five years at school. However up-to-date such lectures may be, they are out of date in a short time. Notes taken in such lectures are more or less useless fragments of knowledge. Their uselessness can be gauged from the way in which they are burnt, torn up, thrown away, or left behind when an examination has been passed, and their sole purpose—to swot for examinations—has been fulfilled.

2. *Half day constructional sketch designs*
It is virtually impossible to give these exercises relevance or proper consideration. More often than not they are an ill-considered copying of somebody else's detail sheets. It is vain to try and relate them properly to lecture content as is thought ideal.

3. *Visits to building sites*
The small number of these visits per term are not an effective way of gaining understanding. Face to face with the multiplicity of techniques, materials and relationships on any site, the student retains surprisingly little. Large parties reduce the benefits even more. Little or nothing is recorded for future reference.

4. *Working drawings*
The traditional working drawing teaches little. As an exercise in communication it fails for the student as it does in practice. But more important, the muddled agglomeration of so many things on one drawing completely confuses any idea of how things are built and what comes first and who, or which trade, does it; not to speak of cost or expense. These drawings are too complex in most cases to allow rational or clear association of building processes with them.

5. *Bibliographies*
Textbooks and articles which are given to students are notoriously rarely used and new literature not readily integrated because it lacks relevance.

6. *Lectures in structures*
These are all too often quite separate from the rest of the course and present problems in such a way that they have little or no use, or meaning, for the architectural student.

7. *Lectures in specification and quantities*
These seem disconnected from the other factors and real building practice. The student shows that he lacks ability to express himself or to describe the processes with which he is familiar.

new course

Origin
The New Course is based on attitudes expressed by W. A. Allen (RIBA Journal, August 1953, *Science in Schools of Architecture*) and taking it chronologically, myself (AJ 22.11.56, *The New Approach*), R. Llewelyn Davies (AJ 23.5.57, *Deeper Knowledge, Better Design*) and Prof. Sir Leslie Martin (AJ, 3.1.60, *An Overall View of the Architect's Training*), as well as others.

Objectives
The objectives of the course are to develop the capacity to:
(*a*) use and communicate information
(*b*) use methods of analysis and synthesis
(*c*) solve constructional problems encountered in architecture.

Range
The Range of the course is not defined by a precis of its complete contents, as is usual, but it is indicated by the list of subjects, and the SfB/UDC reference numbers under the main headings of Theory of Building and Practice of Building. This list, given below, is handed to each first year student, together with a summary of the objectives, and methods, of the course. This classification serves as the universal matrix for the student's constant activity in creating a more and more comprehensive reference file for himself, composed of all information, from any source, deemed relevant to his studies. All filing is to A sizes (see AJ 17.9.59, *Proposals for a Standard Building Classification*, D. Bullivant, and also a forthcoming RIBA publication on the subject).

range of the course

SfB/UDC reference		THEORY OF BUILDING
A	0	SOURCES OF KNOWLEDGE: GENERAL
Aa1	001.4	terminology
Aa1	01	bibliographies
Aa2	061.6	building research institutions
Aa5	34	LAW
Aa6	35	PUBLIC ADMINISTRATION AND REGULATIONS
Aa9	5	SCIENCE, PHYSICS, CHEMISTRY: GENERAL
Aa9	551.5	climatology, microclimatology
Ab1	61	HYGIENE, PUBLIC HEALTH: GENERAL
Ab3	624.04	STRUCTURAL ENGINEERING THEORY
Ac7	72	ARCHITECTURE: GENERAL
Ba	65	ORGANISATION: GENERAL
Ba	65.01	theory of organisation, rationalisation
(11) & C	624.13	GROUND: GENERAL
(16)	624.15	FOUNDATIONS: GENERAL
(2)	629.4	PRIMARY ELEMENTS, STRUCTURES
(3)		SECONDARY ELEMENTS
(4)		FINISHES
(5) & (6)		SERVICES
D/V		MATERIALS

SfB/UDC reference		BUILDING PRACTICE
(11) & C	624.13	GROUND: GENERAL
(16)	624.15	FOUNDATIONS: GENERAL
(2)	624.9	PRIMARY ELEMENTS, STRUCTURES
(3)		SECONDARY ELEMENTS
(4)		FINISHES
(5)		SERVICES INSTALLATIONS (SANITATION, HEATING, VENTILATION: GENERAL)
(6)		SERVICES INSTALLATIONS (ELECTRICAL AND MECHANICAL: GENERAL)
(7)	645.1/.5	GENERAL SPACES AND FIXTURES AND EQUIPMENT
(8)		SPECIAL SPACES AND FIXTURES AND EQUIPMENT
(9)		BUILDING TYPES
B		BUILDING RESEARCH
Ba2	657	costing
Ba7	69.003.12	cost analysis and cost planning
Bb2	69.05	SITE ORGANISATION
C	624.13	EARTHWORK: GENERAL
Cb	624.133	EXCAVATION: GENERAL
D		MATERIALS
E/H		STRUCTURAL WORK AND PRODUCTS
I/J		PIPE AND WIRE WORK AND PRODUCTS
K/L		INSULATION AND MEMBRANES AND PRODUCTS
M/N		SHEETING AND TILING AND PRODUCTS
P/U		FINISHING WORK AND PRODUCTS
V		PAINTING AND PAINTS
X		ASSEMBLING AND EQUIPMENT

teaching: methods

1. *Lectures*

Lectures are no longer routine. They become a special case. To me, a series on basic principles seems particularly important in first year. But the nature of lectures depend on the lecturer. Opportunely he lectures on general principles from angles that he can communicate best. He is informative but also what Ian Michael calls "inspirational."* A synopsis of the contents of all the lectures is given to students before the lectures take place. Each carries with it a bibliography so that a student may read further in any field that interests him.

The series of 12 for the first term for first year includes the following titles:

Values.
Education general and architectural.
Sources of Knowledge.
Communication.
Science and Architecture.
Mechanisation takes command, we must command mechanisation.
Organisation, Administration and Law in Architecture.
Cost and Economy.
Materials and Maintenance.
Services.
Influence of the Site.
Attitudes to Building in Various Civilisations.

Contents are not such that they will be asked for in any examination.

Lecture courses, on any subject short or long, may occur whenever demand or opportunity points to them as special items. But they are not the "staple food" of the course of Theory and Practice of Building, they do not cover any syllabus.

* Teaching & Learning, AJ Ed Supp, 19.7.61

2 *Field Studies of Materials, Processes, Site Works, Assemblies, Manufacture*

If any particular item is the mainstay of the course, it is this new technique of learning.

The field studies take the following pattern:

Many buildings in the area, sufficiently proximate for repeated visits, are introduced to the students, as a body, by the architect or assistant in charge. There may be a collective first visit. Working drawings, and where possible, a report is deposited in the school.

Subsequently students select for themselves, or are given, aspects of materials, processes, etc., to study by observation, for consultation of references, and to encourage use of their critical capacities, one aspect at a time. Such studies may be based on one visit or many. They can deal with any aspect of the practice of building, and the student can choose a subject which particularly arouses his or her interest.

Each student prepares a short written report (to 'A' size) on the particular aspect of the job which he has studied; copies of this report are then given to each student in the group, and at successive seminars the continual stream of reports is discussed. The lead is taken by the two or three students who will have read the particular report for that purpose. As the year goes on each student will collect a file of reports on each building of which studies are made. Buildings may be studied for many years after completion on weathering and other aspects of efficiency, by students who will have access to all earlier reports in the library file where they are collected. Each building will have a file in the Library with SfB/UDC breakdown of the material.

This educational process has enormous advantages. The student learns to look with purpose. He is in direct contact with building. He connects the building with drawings, technical literature and the tradesmen. He gains a sense of time and cost about building. He learns to express himself succinctly and clearly about architecture. He learns how to produce a report in a form capable of easy reproduction. He learns to look at reports critically and appreciates the meaning of communication. He learns to speak clearly about buildings. He feels in contact with the local architecture and the local architects, the local builders and local practices. He continues to look at the buildings he has studied.

The corollary to the above is that the local architects realise that students are looking at their work intelligently and continuously. They appreciate the direct contact with the school and many of the individual students.

There is no intention that four years of such studies and reports should cover a syllabus or list of subjects. They are exercises in learning and communication that make the student proficient in learning and communicating in any circumstance subsequently: St J. Wilson's "jungle fighter."* This is an educational technique which uses intelligence, the capacity to deal with novel situations, instead of deadening it, as most current educational techniques do.

Such field studies were first tried with the third year and the results promised well for the full employment of the new technique in all years. Below is a list of

* Sir Leslie Martin, AJ 3.11.60.

the buildings visited and some of the studies undertaken:

I. *West Bridgford Technical Grammar School (Clasp System)*
Studies:
Timing of operations,
Pitch fibre drainage,
Steel work,
Windows,
External finishes.

II. *Traditional buildings:*
Brickwork,
Timber-paraboloid roof,
Shuttering,
Crane-use practice,
External finishes, etc.

3. *Design studies*
As a spontaneous part of many designs, a student will produce studies (drawings, sketches, models, reports), dealing with the constructional methods and ideas behind his building; details will illustrate this.

4. *Bibliographies and use of literature*
The sub-committee appointed to consider the nature of the new course in Nottingham (Bowler, Ford, Ritter) was agreed that, in the studio, possibly near each group (Nottingham school is divided into groups of all years under group masters), there should be a reference library, in addition to the central school library; that this should be organised on the SfB/UDC system; that it would be run by the students themselves, and incorporate all easily duplicated material received each week. The central technical library of the school would be run in a similar way.

5. *Structural awareness studies*
The integration of the teaching of structures into the new course is as yet incomplete. Lectures carry on much as before. But structural awareness studies have been formed into a concentrated ten half-day series at the beginning of the *first year* to give the student a solid appreciation of fundamentals. The efficiency of such studies has been shown in a sporadic way, at Nottingham since 1952 (see illustrations). These exercises include the design of a structural element to illustrate a specific point and are very carefully thought out. Usually a test to destruction makes vivid the point in question. Engineers help in seminars on as many occasions as possible.
A very brief report with photographs summarises the experiment. The set-up of such studies is given below.

The programme sheets given to students:

Structure Study 1 MATERIALS
Demonstration: Heat simultaneously two similar bars of chocolate carrying a similar load with a similar source of heat (candle?), one bar wrapped in foil, the other not.
Seminar points: Ways of breaking, visiostatic and non-visiostatic tension, compression (bending), shear (torsion), fire and fire resistance by use of second material:
References: Principals of Structural Design by Lisborg, 1961, pages 164-7, 262, 299, 324, 354 (this title will from now be abbreviated to PSD by L).
Report: Formulate a short meaningful analysis of materials and their structural properties. (A size paper for all reports.)

Structure Study 2 COMBINATION OF MATERIALS
Design for Test: Two plaster beams cross-section ½ in x 1 in x 14 in, one of them with brass wire re-inforcement to be specified, one without. Plaster mix to be the same for both. The above cross-section is a maximum. Plaster may be reduced to a lesser dimension, or holes or dents carved, or cast, to achieve the maximum self weight/load carried-ratio. 14-in. length is fixed. Load to be hung, as point load from 1-in. wide strip at the centre of the beam.
Seminar Points: Structural combination of materials; chemical; resistance to forces; fire or water; nature of failures of beams; re-inforced conc.;
Reference: PSD pages 178 181.
Report: On test.

Structure Study 3 FORCES
Design for Test: With six or seven macaroni and glue, specified, make any kind of beam, plank or slab to carry the maximum load across the span, leaving ½-in. bearing on each side. Load placed centrally on 1-in. strip.
Seminar Points: Tension, compression, (bending) shear, (torsion) kinds of sheer, determining what forces shall be encountered; form in structure:
References: PSD pages 4-16, 32-35.
Report: On test.

Structure Study 4 FORMS
Design for test: With one sheet of typing paper and glue, specified, make the tallest possible free standing structure capable of supporting a 6 lb brick. The brick will be placed on a thin piece of plywood to allow careful placing. Wind will be carefully excluded.
Seminar points: Forms for compression (hyperboli), forms for tension, for bending, stressed skins, pinned arches, direction of forces, stability:
References: PSD pages 20-27, 45-52, 27-28, THE ARCHITECTS' JOURNAL, 3.3.49. Samuely—Force & Form, RIBA JOURNAL, March, 1952. Samuely—Space, Frames and Stressed Skins.
Report: On test.

Structure Study 5 STABILITY
Design for Test: Repeat materials and test as before with the following variation: wind will be simulated by strongest possible blowing from student body from a distance of not less than 2 ft.
Seminar Points: Wind force, bracing, triangulation, three supports or four?, connections and continuity:
Reference: PSD pages 20-21.
Report: On test.

Structure Study 6 CONTINUITY
Design for Test: Prepare a design which will be built by another student for the test, without your aid; given a piece of timber 2 ft long and 3 in wide and 1 in thick, a brick is to be supported one brick height from the ground (4½ in approximately) over a maximum, completely unobstructed area. (Similar to the problem of a diving board.) Six bricks may be used in your design.
Seminar points: Communication of ideas (continuity!), comparison of each individual's approach; fixed ends, rigid and non-rigid structures, continuous slabs, the ground, foundations, buttresses to thrust; timber connectors, welding; problems in prefabrication.
References: PSD pages 217-226, 40-42, 45.
Report: Criticism of the way the design was communicated, and proposals to illustrate the point of continuity in tests for succeeding first years.

Structure Study 7 FORMULAE
Test or demonstration: A beam will be shown to you spanning about 1 ft with fixed ends. You will be asked to determine intuitively what load will break the member, and how it is likely to fail.
Seminar points: Fixed ends, free ends—difference; safety factor, what are the forces involved in building and in nature in actual quantity; can you tell how heavy 10 pounds feel? how long is a foot? how large an acre? how high All Saints' Spire, the inside of Tennyson Hall?

Reference: PSD pages 59-60.
Report: Deduce the unit strength of the material used in the test and write a critical note on the use of the material.

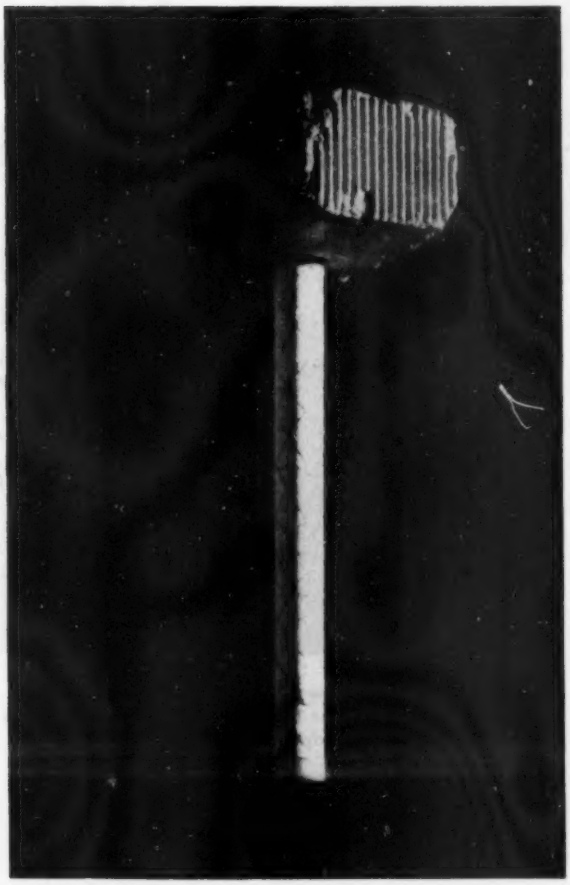
Structure study 8 BEAUTY
Design for test: Design for a support of a brick in an exhibition stand giving optimum stability, and clarity of view. It should be possible to see all the sides of the brick and feel them. The support would be placed on a table to get the right level. This should be specified in your design.
Drawings or a model may be produced.
Each design will be assessed and analysed by structural and aesthetic principles.
Seminar points: Aesthetic principles and structure; functionalism; why is a wc pan beautiful? what is beauty? is static beauty specific?
Reference: *Architect and Building News* Ove Arup Article 8.5.1954, also in AJ 29.4.1954, ARCHITECTS' JOURNAL 9.5.1957. "I won't play you the Eiffel Tower" Max Lock.

Structure study 9 NATURAL FORMS
Each student gives a short illustrated paper: Taking a structural form from nature analyse its efficacy, relate it to the function it serves and suggest improvements (!!!) "Structure is frozen movement." (W. Reich.)
References: Pettigrew, Design in Nature, Cook, Curves of Life.

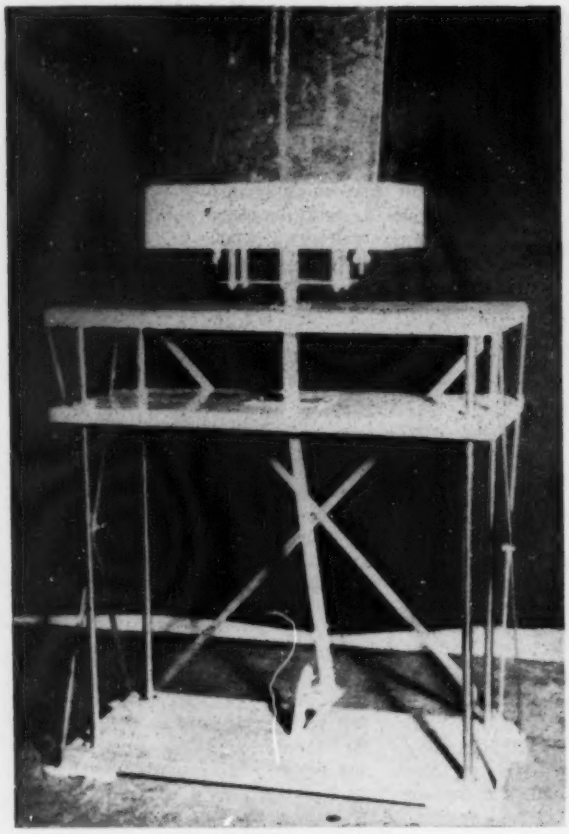
Structure study 10 HISTORY OF STRUCTURE
Each student gives a short illustrated paper on the above subject; the styles, as well as all manner of primitive building can be included. "History is yesterday."
Taking one particular building analyse describe and assess the aims, function and efficiency of the structural system or systems.
References: RIBA *Journal*, September 1952 on Ely Cathedral Lantern, *Architecture and Buildings*, September 1957, Intentions of Talford.

8. *Working drawings*
Working drawings can be of the live project or a design scheme done as studio work. In either case the approach is that of the elemental working drawing.* This is a new technique which may well be developed further. But the benefit derived from the clarity of this technique as adopted at Nottingham in the past four years, shows the basic principle of subdivision into elements to have been very effective.
It dovetails well into the general classification of the course according to SfB/UDC, and the meaning of each drawing and each trade relates well to the type of report that has resulted from field studies. One such set of working drawings (see illustrations) has earned the school the Archibald Dawnay Prize. E. W. Marchant.
Clarity and content are the main criteria in marking, not the quantity of drawings produced.
Many aspects of the course in Nottingham are well integrated with the New Approach as outlines, but it is the aim to carry this integration much further, benefiting understanding of each of what are now separate "subjects."
One day has been set aside for the activities of the course in Theory and Practice of Building (in addition to Structure Lectures). In the second, third and fourth years, much of this time may in fact coincide with studio work on structural aspects of work in hand. In the first year the day will be well filled with the lectures, seminars, structure studies and report writing, and consultation of textbooks.
We need more good textbooks on many subjects dealing with basic principles and functions rather than lists of currently fashionable products. But it is of the greatest value to have the SfB/UDC classification; the use of this by the professional journals; such books as that written by Lisborg; and such schemes as the AJ's checklists and proposed programme for advertisers' supplements, which are informative and classified as above. The RIBA booklet on the classification will be of great help in teaching, as are the articles on principles of professional practice, cost analysis and many other subjects which are treated rationally and functionally in Journal articles. All these things make possible the change to a more efficient and more enjoyable architectural education.

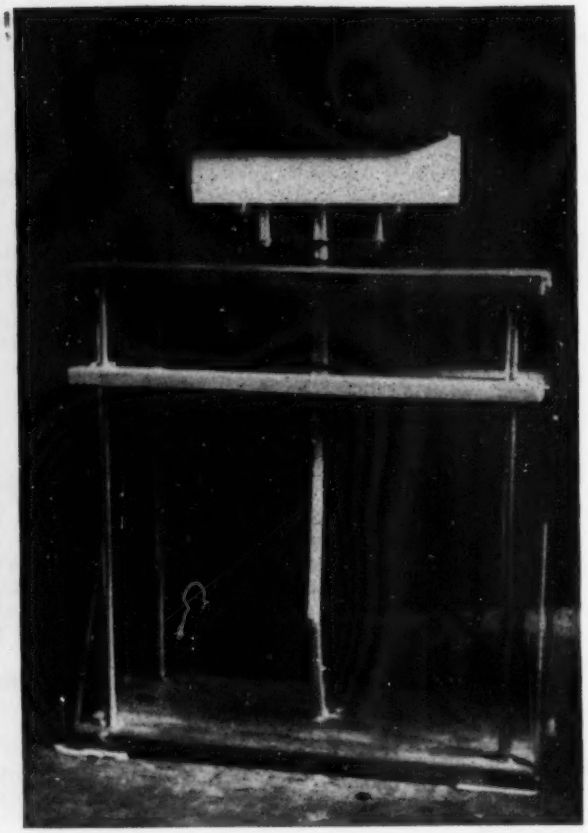
* See AJ, 15.6.61



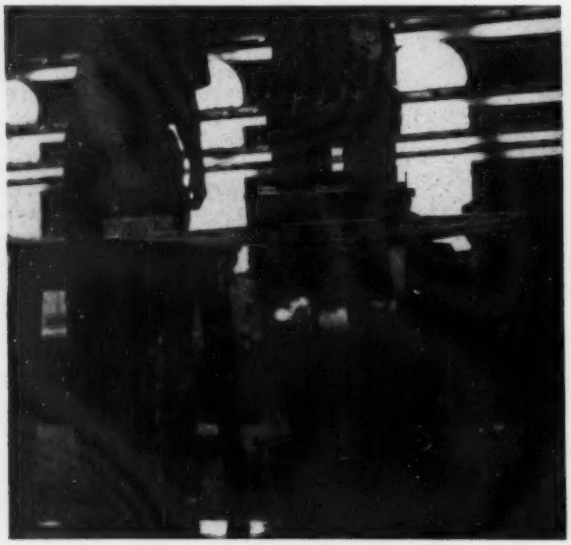
A column of typing paper to support 6-in brick



A well-designed balsa column tested in this apparatus restraining it top and bottom, and with a cross section of ½-in maximum, will take 10,000 times its own weight as a load. The columns are 18-in high



Tested to breaking point



A 3-in span 1-in × 2-in will take 1,000 times its own weight. Two identical beams make testing easy. Water, sand or pennies can be added gradually—pennies are best, unless lead shot is available. Water was used—note mess on

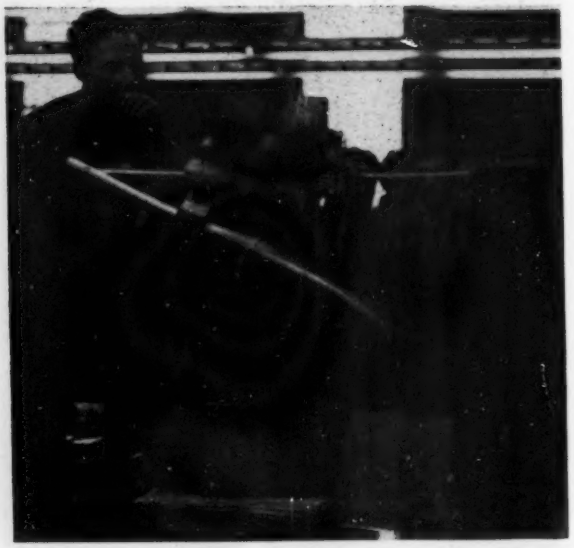


table. Wedge-shaped support allows the two 2-in. timber strips to move with the beams as they deform, which avoids damage by cutting in of edges

MOHLG

Three enquiries

Results of three MOHLG Inquiries were announced last week:

At *Stevenage*, the Minister has temporarily excluded about eight acres of land round St. Nicholas Church and Rooks Nest Farm (E. M. Forster's "Howard's End") from building development, but the whole problem is to be reconsidered when the Development Corporation's revised master plan, now in preparation, is completed.

The population of Stevenage is likely to be raised from the 60,000 originally projected to 80,000, and in the light of this the MOHLG inspector, D. F. Offord, pointed out that the area might no longer be considered appropriate for low-density housing, and that in any case it was advisable that there should be a pause for reconsideration. Residents whose protests provoked the inquiry held a public meeting in the town centre last month to consider the decision, and to protest against a further proposal to build in Fairlands Valley, a favourite walk and picnicking resort.

In *Chelsea*, the Minister has rejected an LCC request for a preservation order to prevent redevelopment of Royal Avenue, but also rejected an appeal by Town Investments against the LCC's refusal to permit the demolition of numbers 1 to 15 in the street, and replace them with new houses.

The Minister decided that Royal Avenue is a street of no historic or architectural interest, that the houses were not of sufficient architectural interest to rate a preservation order, but that the new houses proposed represented "an uneasy compromise between past and present." Had Mr. Brooke sanctioned a preservation order these would have been the first houses of such recent date to acquire protection.

At *Gerrards Cross* the Minister rejected an appeal by a development company which wanted to build 78 flats and garages on a five and a half acre site but had been refused permission by Buckinghamshire CC. The proposal would have raised the density from five per acre to forty.

ANNOUNCEMENTS

H. C. Fallek, ARIBA, has moved to the Ministry of Public Works and Communications, PO Box 384, Addis Ababa, Ethiopia, where he is now assistant chief architect.

George Lewis Edwards, ARIBA, has now taken up his appointment as county architect to Radnorshire County Council, County Hall, Llandrindod Wells, and will be pleased to receive trade catalogues and technical literature.

Norman G. Denham & Partners, chartered architects and surveyors, of Winchester and Salisbury, have recently opened an office at 1A Essex Lodge, Worting Road, Basingstoke, and will be pleased to receive trade catalogues and technical literature.

Hendry Cuthbert, DA(Edin), ARIBA, and Kenneth W. Towell, Dip Arch(Manc), ARIBA, have formed a partnership under the name of Cuthbert & Towell. Their address is Stubbs Chambers, 15 Fold Street, Bolton, Lancs, where they will be pleased to receive trade literature.

Michael Bowley, ARIBA, has moved from his offices in Belfast and is now conducting his practice at 201 Bath Street, Glasgow, c2 (telephone City 7790).

Burles & Newton have opened a new branch office at 7 Nicholas Street, Manchester 1 (telephone Central 6657) where they will be pleased to receive samples and trade literature.

Owing to the death of P. Neville Taylor, ARIBA, the style of the practice of Taylor & Yandell was changed to T. Jeffery Yandell as on October 1.

F. Silvester White, ARIBA, ARICS, AMTPI, has retired from his appointment as Commissioner for Town Planning to the Government of Tanganyika and has taken up the newly created post of burgh architect and town planning officer with the Corporation of Greenock, Municipal Buildings, Hamilton Street, Greenock.

The architects' department of Crudens Ltd, Musselburgh, Midlothian, is extending its technical library and will be pleased to receive trade literature, reference material, etc, from advertisers and manufacturers, which should be addressed to the technical librarian.

Emberton, Franck & Tardrew have opened additional offices at 20 Arcade Chambers, Bognor Regis, and will be pleased to receive trade literature.

R. H. Dolan, ARIBA, of 36 Kenwood Drive, Walton-on-Thames (telephone Walton 26980), has opened a new office at 81a Chertsey Road, Woking (telephone Woking 3891-2); P. D. Hunt is associate in charge. The firm will be pleased to receive trade literature at the new address.

File this week

Roads and pavings, the subject of this week's Element File [SfB (14)] starts on page 689. But from the opposite page onwards the AJ is preclassified for tearing out and filing in SfB order. The subjects are as follows:

1. Technical Study: **Structural Shells in Timber,** SfB (27) Hi. This is the second part of last week's Technical Study and should be filed in SfB sequence, but separately from the Element File (pages 666-669).

2. Working Detail: **Wall: external, non loadbearing, SfB (21).** Glazed wall to a house in Uppsala, Sweden (page 670).

3. **Products File:** a record of new products and services on the market so arranged that it can be torn into A6 sheets. For further information on the products fill in the reply-paid enquiry service form at the end of this issue.

4. Building Study, second series: **Shops, offices and flats in Soho.** This cost analysis and appraisal should be filed under SfB (92)

Then follows:

Element File SfB (14) containing:

5. Element Design Guide: **Roads and Pavings.**

6. Technical Study: **The Structural Design of Roads.**

7. Information Sheets. Parking Arrangements for Cars and Cycles, Road Junctions and Turning Circles, Californian Bearing Ratio, Road Construction, Movement Joints and Pavement Surfacings.

Next week you will receive SfB (15): **Garden: General.**

AJ SfB (27) Hi

Technical study UDC 69.024.4: 694.1
Roofs, structural, pitched: Shells

Structural shells in timber

2: The Geometry of Shells

Having last week recounted the historic development of timber shells, Hugh Tottenham and Charlotte Hume now consider the shell as a geometric and structural form. This week they take domes and vaults, reserving saddle shapes for their next article. On page 668 they give tables defining the economic spans for these first two classes of shell

A shell is a thin curved skin: a structural shell is a thin curved skin structure. The fundamental differences between a shell structure and any other form of structure are:—
(*a*) the shell is itself the primary load-transferring medium,
(*b*) the strength of the shell is inherent in its shape,
(*c*) the quantity of material to clear covered area ratio is smaller.
The developments during the last 30 years have resulted in a greater understanding of the behaviour of this form of construction, which in turn has led to further experimenting in new shapes and forms.
It is generally appreciated that there is an endless variety in the shape of shell that can be built, but it is not generally realised that basically shell construction can be divided into only three categories:—
1. dome-shaped,
2. vault-shaped,
3. saddle-shaped.

Although the description " shell " is applicable to all curved skin structures, there is as much difference in the structural behaviour between the three main groups as there is between various forms of framed construction. This is due to their different intrinsic geometrical properties.
The classification depends upon the position of the centres of curvature, thus—
1. in a dome-shaped structure the centres of curvature of all sections are on the same side of the surface;
2. in a vault-shaped structure the centres of curvature of all sections are on the same side of the surface, except for one section, which is a straight line;
3. in a saddle-shaped structure the centres of curvature are on either side of the surface depending on the direction of the section.
The position of the centres of curvature effect not only the local stiffness of the shell but also its general stability; hence a dome-like structure is rigid in itself, point loads causing only local deformation, whilst a saddle shaped structure is essentially flexible, point loads causing deformation over the whole surface. The rigidity of vault-like structures depends on stiffening diaphragms in addition to its curvature and deformation due to point loads will spread in the direction of the straight section.
This advantage of the dome over other shapes is somewhat offset by its tendency towards elastic instability. With dome-shapes there may occur a critical internal balance of forces when a small increase in load will lead to a sudden inversion of a part or the whole of the shell. This is explained diagrammatically in Fig. 1. In saddle shaped shells this obviously cannot occur. It can therefore be seen that whilst in the latter case any failure will be due to overstressing of the material, in the first case it may be due to failure in the geometry of the shell.
This tendency to buckling of dome-like shells must be

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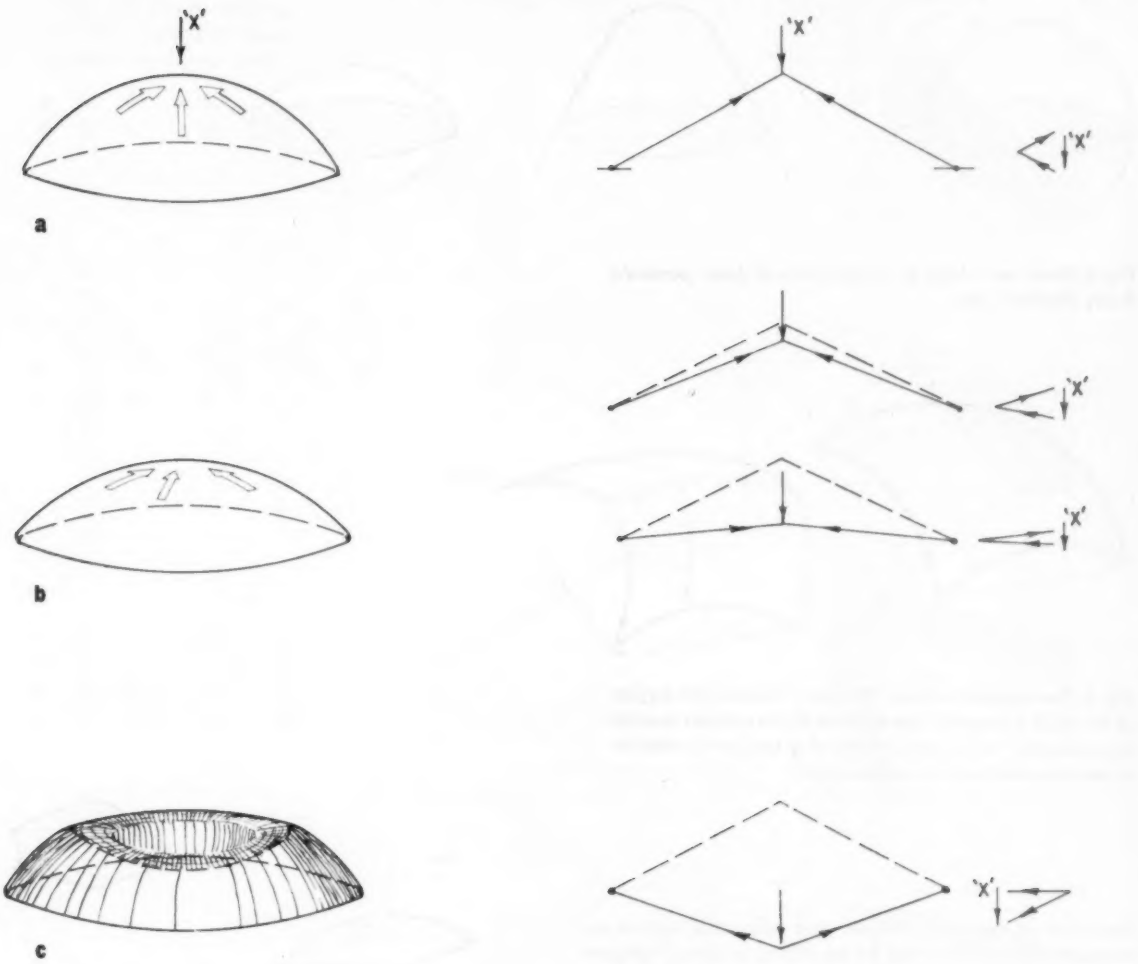


Fig 1 The structural behaviour of a dome
(a) A load at the apex is resisted by the vertical components of compressive forces
(b) These forces cause a " shortening " of the material and hence a flattening of the structure; as the dome flattens the compressive forces must increase to maintain the same vertical component; as the compressive forces increase the shortening also increases causing further flattening
(c) This process continues until suddenly the structure inverts itself; tensile forces now maintain the load and the structure reaches a stable position

weighed against the flexibility of saddle shaped forms; the vault-like shell is mathematically the transition between these two and possesses all their characteristics in a modified form.

A complete shell such as a sphere is a self-sufficient structure. Any section thereof however must be stiffened at the edges and any general distortion of the surface restricted. This can be achieved by means of ties, ring beams or buttresses.

1. *Dome shapes*

The main geometrical shapes in this group can be divided into:—

(*a*) ROTATIONAL SHELLS. These are formed by a curved line rotating about a central axis. The most frequently used is the spherical dome, which is based on a circular arc. Variations of this basic form can be obtained by using different curves, such as ellipses or parabolas, resulting in shells with either flatter or steeper crowns (Fig 2).

The functional requirements of the building concerned will dictate the particular type of dome structure to be used. Thus in the case of a storage building an elliptical dome may be preferable to give maximum use of internal space; whereas when a large circular area is to be covered so as to provide the minimum enclosed volume, the most satisfactory means would be a spherical dome in which the radius of the curvature greatly exceeds the radius of the base.

The application of rotational shells is normally restricted to wholly or partly circular plan forms. Their adaptation to any other shape would be uneconomical.

(*b*) TRANSLATIONAL SHELLS. These are formed by a curved line moving along another curved line which may or may not be of a similar geometrical pattern. Of the endless variety of possible combinations the most satisfactory ones for general structural application are the elliptical paraboloid and the circular translational shell (Fig 3). The first of these is generated by one parabola following along

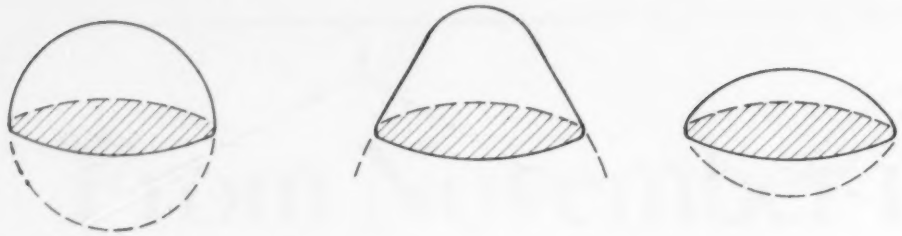


Fig 2 Rotational shells. (l. to r.) spherical dome, parabolic dome, elliptical dome

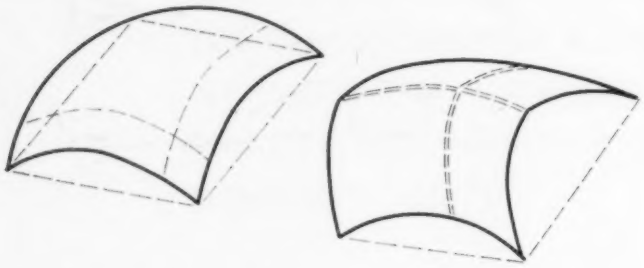


Fig 3 Translational shells. The dotted lines on the surface of the shells represent cross sections. Cross sections parallel to one another will be similar, but they need not be similar to cross sections taken at right angles

the curve of another parabola; any horizontal section cut through this surface would be an ellipse. In the second case the surface is formed in a similar manner by circular arcs. Any other known curves of defined or undefined nature can be used in conjunction with itself or any other.

These shells are much more adaptable than rotational shells and can be used to cover regular or irregular plan shapes. Their most frequent application at present is undoubtedly in industrial buildings, where multiple usage is made of a square or rectangular unit separated to provide natural lighting in the roof.

Single translational shells may be used spectacularly for buildings for assembly and recreation, where the inherent characteristics of these shells give the architect complete freedom to express the functions of the building unimpeded by any consideration of the structure; the shell can be designed to satisfy the plan requirements and elevational treatment.

(*c*) MEMBRANE SHELLS. The shapes used in these shells are those formed by a membrane stretched over the required plan area and distorted by uniform pressure until the requisite rise is obtained (Fig 4). The great advantage of these shells is that they can have horizontal edges which can also act as ties. Although they can be used over any irregular area, the curvature is always controlled by the rise at the centre. They are ideally suited to cover large storage areas, as the rise can be kept to a minimum thus reducing the unusable roof volume and the absence of any obstruction in the form of ties or buttresses ensures complete use of the enclosed space.

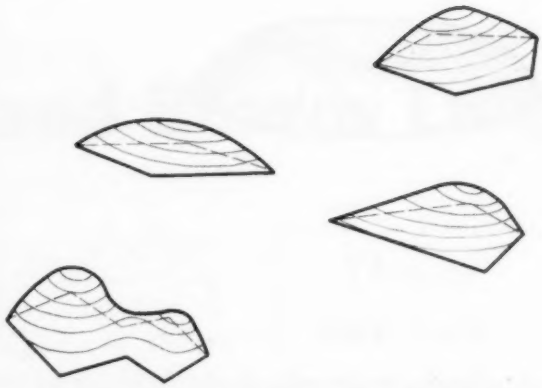


Fig 4 Membrane shells. The edges of each shell can all lie on a simple horizontal plane

2. *Vault shapes*

Any curve moving along a straight line develops a vault or barrel shape which can be used wholly or sectionally, hence:—

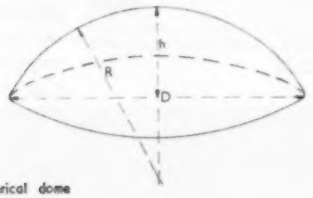
(*a*) BARREL VAULTS. The most commonly used shells of this type are of circular, parabolic or elliptical section; they may be used either individually or in combination with others of a similar or different section.

Normally single or multiple units would have horizontal eaves at the same level but if the edges are at different levels roof lighting can be introduced (Fig 5). Similarly if the ends of adjacent barrels are displaced vertically in respect to one another, then glazing can be incorporated (Fig 5). Another satisfactory method of providing natural lighting is to place glazing along the crown of the barrels.

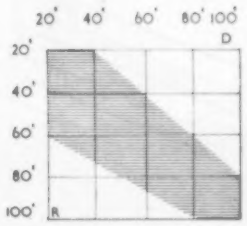
These shells are really only suitable for covering rectangular areas and can be placed so that the straight edges of the

Tables and graphs showing economic dimensional range of timber domes and vaults

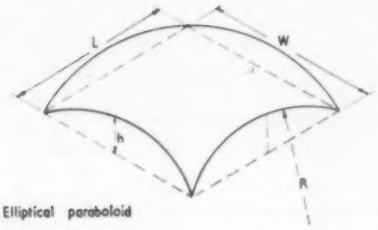
D	40′	60′	80′	100′
R	30′	50′	75′	100′



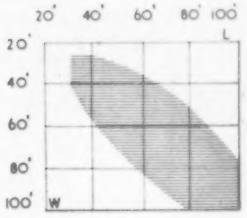
Spherical dome



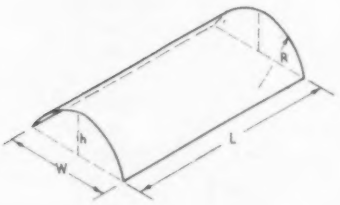
L	40′	60′	80′	100′
h	4′	6′ 6″	9′ 3″	12′ 6″
R	52′	72′	90′	106′



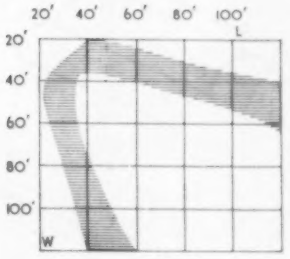
Elliptical paraboloid



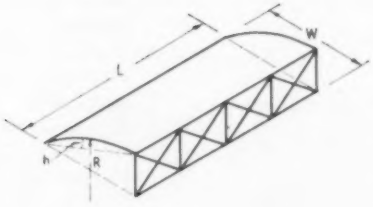
L	60′	80′	100′	120′
W	30′	35′	37′ 6″	40′
R	25′	27′ 6″	30′	30′
h	6′	8′ 6″	11′	13′



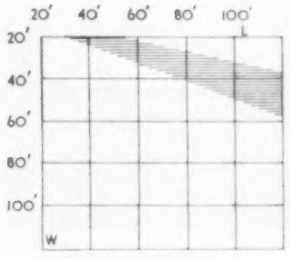
Barrel vault



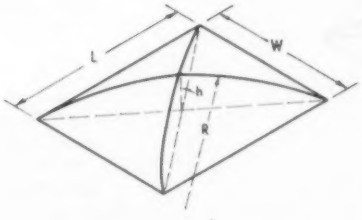
L	60′	80′	100′	120′
W	20′	30′	40′	45′
R	20′	30′	35′	40′
h	7′	11′	14′	20′



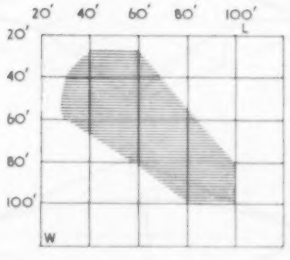
North light barrel with girder



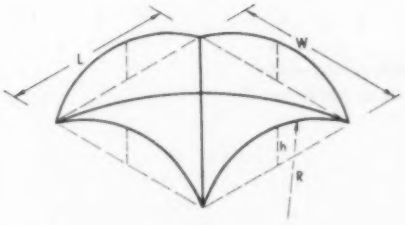
L	30′	50′	70′	90′
R	25′	40′	60′	85′
h	5′	8′ 9″	11′ 3″	13′



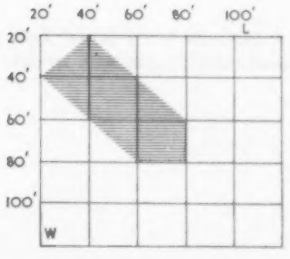
Cross vault



L	30′	50′	70′	90′
R	25′	40′	60′	85′
h	5′	8′ 9″	11′ 3″	13′



Grain vault



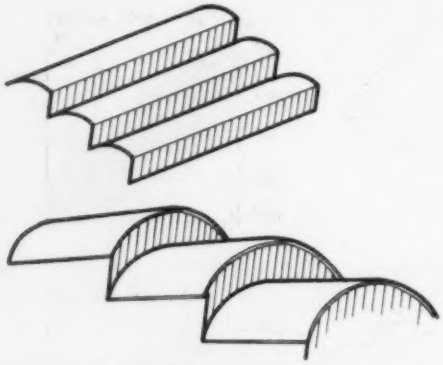


Fig 5 Use of barrel vaults to provide lighting between vault units

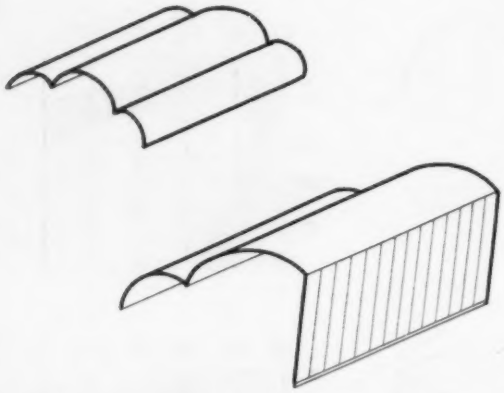


Fig 6 Juxtaposition of barrel vaults designed to act structurally as a single unit

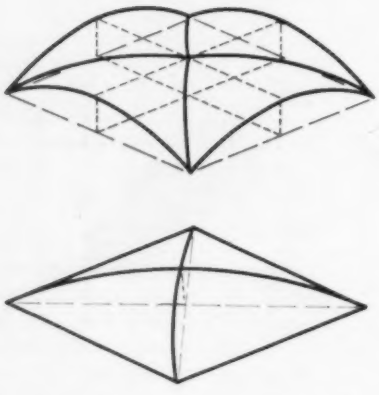


Fig 7 Sectional barrel vaults. Left, with curved eaves (groined vault); right, with straight eaves (cross vault)

barrels run either along the short or long sides, the ideal proportion of breadth to length ratio is 1 : 3 irrespective of the direction of the curvature. Each unit normally requires stiffening beams at both ends and supports at all four corners, but with long barrels several can be placed side by side and supported on a common stiffening beam spanning across a number of bays. Where barrels are connected longitudinally, supports are necessary at every junction, the spacing of the columns in this direction can only be increased by using larger units.

It is possible to continue two or more barrels of similar or dissimilar section in such a manner that they behave structurally as a single unit and because of this, larger areas can be covered more economically (Fig 6).

The numerous possible arrangements make these shells suitable for a large variety of structures and their applicstion to various types of buildings a practical proposition.

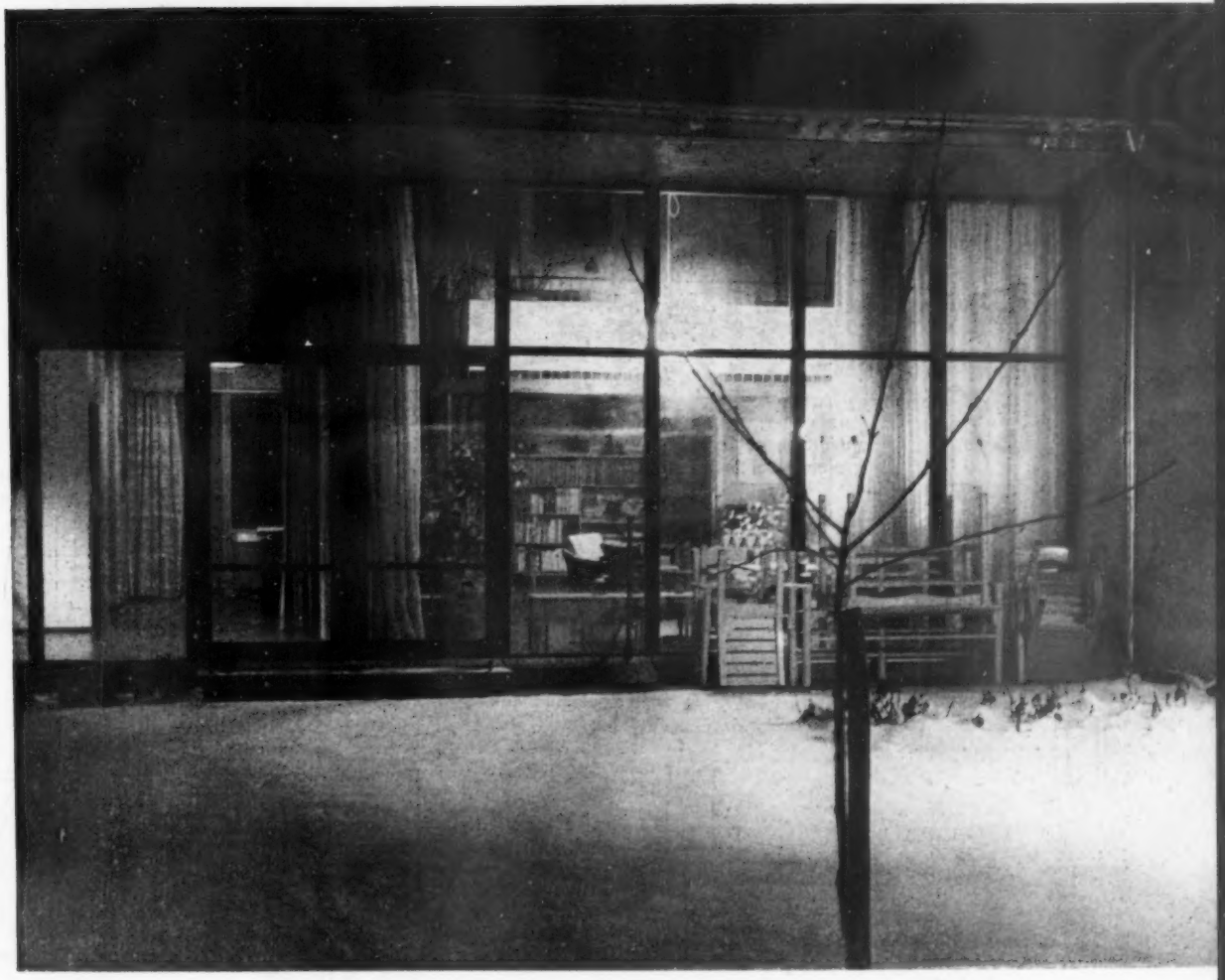
(*b*) SECTIONAL BARREL VAULTS. These are formed by a number of intersecting portions of barrel vaults. Most frequently four segments are linked to provide a square or near square roof. These segments are triangular on plan, the base of each triangle can be either curved (groin-vault) or flat (cross-vault) (Fig 7). In the former case the crown of each segment is straight and the eaves of the roof are curved while in the latter case the central section between apex and eaves is curved and the eaves of the roof are straight; the last mentioned is of particular interest as it has the advantages of domes for strength and stability, and of barrels for ease of construction without the attendant disadvantages of either.

Both these types of shell lend themselves to repetitive use on various column grids, based on the triangle, rectangle, hexagon, or a combination of these. Roof lighting can be introduced quite simply; in the groin vaults by spacing the individual shell units as with the elliptical paraboloids and in the cross vaults by perforation, although a combination of both these means of natural lighting can be used with either shell, forming an integral part of the structure. It is possible with both these forms to cover very large areas.

The description of the geometry of shells is continued in the next article. The tables on page 667 give the range of economic dimensions of timber shells, using the forms described so far.

AJ SfB **(21)**

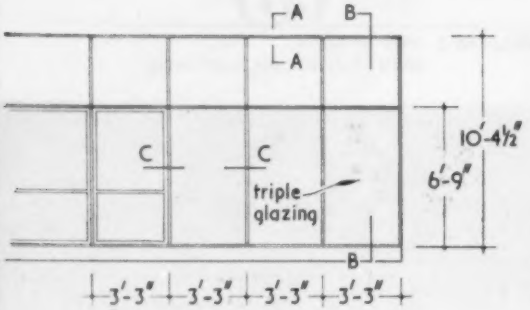
Working Detail No 3 **UDC 69·022·3**
Walls: External, non-loadbearing



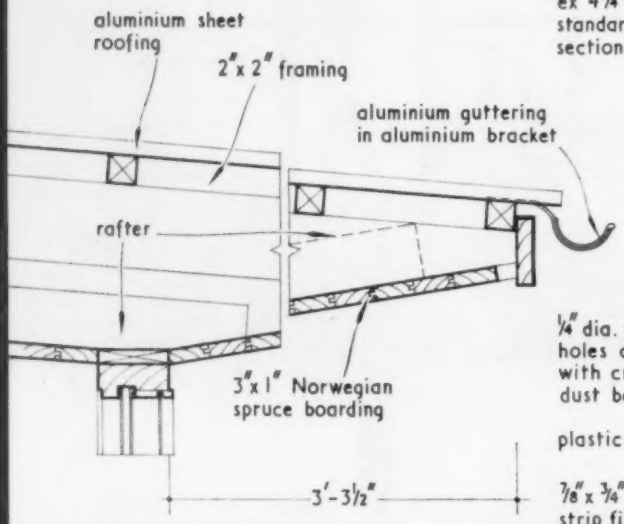
Glazed wall: House at Uppsala, Sweden

Hans Matell, Viking Göransson, Carl-Eric Nohldén, Ulla Hansen-Campbell, architects (material supplied by C. B. Wilcher)

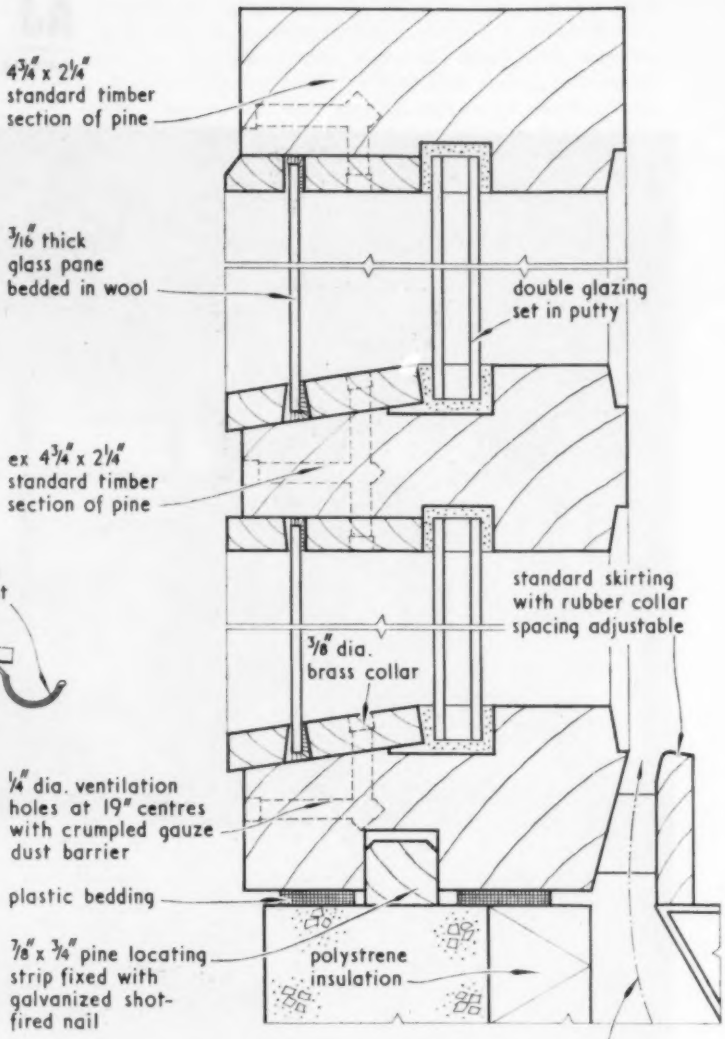
This is an interesting example of an attempt, in the context of domestic architecture, to reconcile a high standard of insulation with large areas of glazing. Note (on the drawing) the holes in the transoms to ventilate the outer air space in the triple glazing, the warm air duct behind the skirting to eliminate down draught and the plastic moisture barriers in the mullions



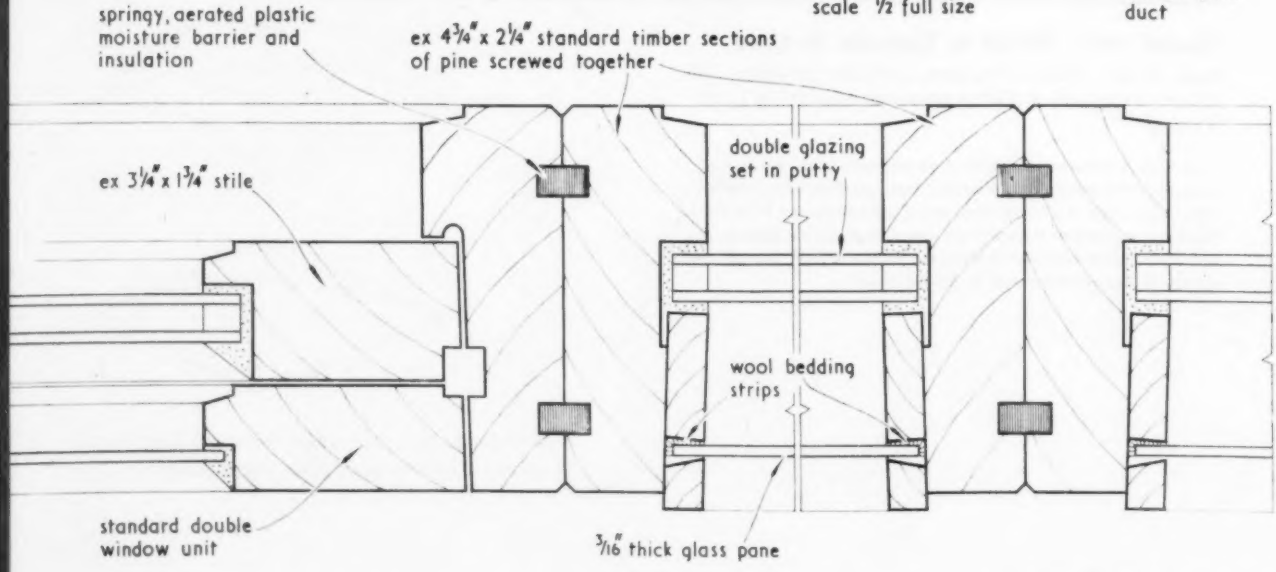
KEY ELEVATION. scale ⅛"=1'-0"



SECTION A-A
scale 1"=1'-0"



SECTION B-B.
scale ½ full size



PLAN C-C. scale ½ full size

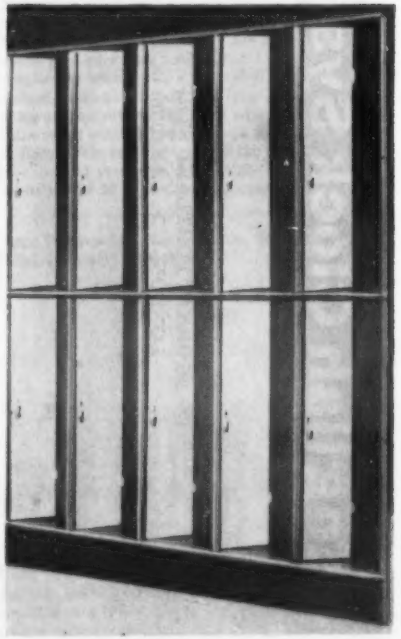
note: figured dimensions in feet and inches are approximate

SfB (74)

UDC 645·45

Clothes lockers

The photograph below shows a range of double tier clothes lockers which have been designed with the cabinets set at an angle, so



Randall double tier clothes lockers

that a certain amount of space is saved, and at the same time it has been possible to improve the ventilation. The cabinets are made in banks of five, with right- or left-hand door opening, and are deep enough for clothes to be placed on a hanger, while they also contain a shelf and hooks. Standard base sections are also made, and the lockers are also available in a single tier version.

James H. Randall & Son Ltd, Paddington Green Works, London W2

AJ Products File October 18 1961

SfB (53)

UDC 696·4

Heated towel rail

Hull Steel Radiators have now included a towel rail unit in their range of radiators. It is made in two sizes, with widths of 30 and 38 in, the total heating surfaces being 7.8 and 9.7 sq ft. The smaller model costs £9 19s 6d and the larger one is £1 more, finished in white or cream stove enamel. Overall height is 33½ in, but this depends also on the fixing of the wall brackets.

Hull Steel Radiators Ltd, 1515 Hedon Road, Hull

Heated towel rail by Hull Steel Radiators

Products File by Brian Grant

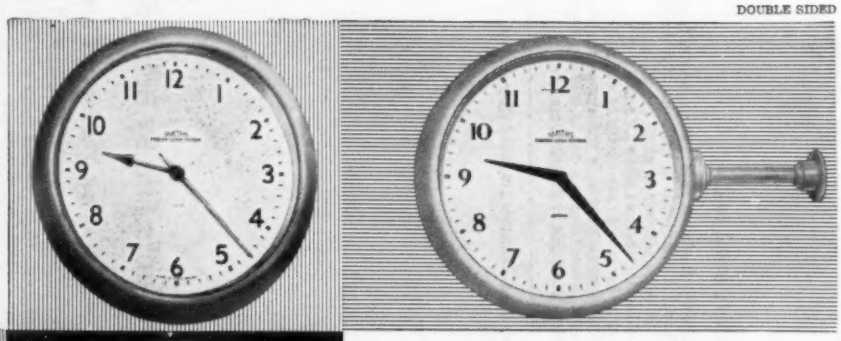
As readers can see, The Industry has been replaced by Products File. Each item occupies either a quarter page (ie A6 size) or a half page and is given an SfB number so that readers may cut the page up and file each under its right number if they so wish. The half-page items can be filed in A6 filing boxes simply by folding in half. Alternatively, readers may tear out the whole page and file all Products File pages together. In either event they will be relieved to know that Products File pages will never back onto editorial matter. Readers wanting more information from manufacturers may turn to the back page where they will find Products File items included in the list of advertisers. The reader, therefore, has merely to tick the manufacturer's name, add his own name and address, detach the page and post it to the Journal, using the reply paid folder.

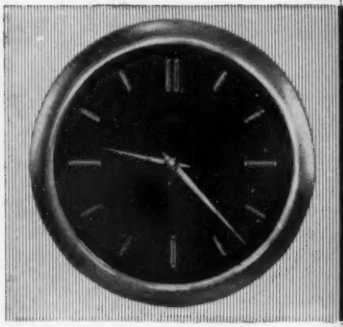
MAYFAIR/FARNHAM

A certain style

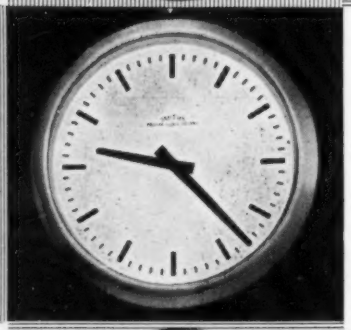
DOUBLE SIDED

MEDWAY/FIFE





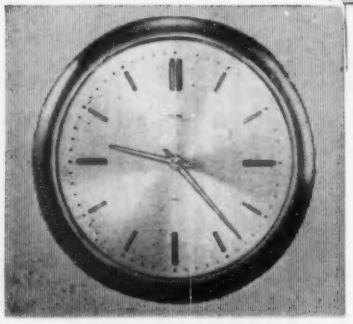
FALCON



MOSTYN/FLEET

MELTON/FLEET

FULMAR



—a style for every setting in every type of building.

All the interior wall clocks in the wide E.C.S. Range (a selection of which are shown) have been accepted by The Council of Industrial Design for Design Index.

They are made in a number of sizes for operation from A.C. mains or from the E.C.S. Master Clock as part of a controlled time system.

For full details of the complete range write:

English Clock Systems

Branch Offices in:
BIRMINGHAM
CEN 8737-8
LEEDS Leeds 24110
MANCHESTER
CENtral 0858
GLASGOW CITy 4897
BELFAST Belfast 32911

ENGLISH CLOCK SYSTEMS
179-185 GREAT PORTLAND STREET,
LONDON, W.1 LANgham 7226

A branch of the Clock and Watch Division of
SMITHS

SfB (53)

UDC 696·11

Plastic storage cisterns

Osma are now producing a cold water cistern made in glass-fibre-reinforced polyester resin. Capacity is 30 gallons and the price is 79s. The producers give a guarantee of ten years, but one would imagine that the life of the cistern would be a good deal longer, for it is not attacked by water with a high acid content, and it should also be entirely free from corrosion. Holes can be cut out for pipes with normal drilling and cutting tools, though it is necessary to place a wooden block inside the cistern to take drilling pressures. The weight of the cistern is just under 15 lb so that it is easy to handle.

Osma Plastics Ltd, Grove House, 551 London Road, Isleworth, Middlesex

SfB (75)

UDC 648·23

New washing machine

English Electric have announced a new washing machine which also rinses and spin dries, all to a time programme which can be set on dials in advance. Price is £75 12s. The washing drum can be filled with cold water to be heated by a thermostatically controlled 2¾-kW immersion unit, or the hot domestic supply can be used. The machine is emptied by a pump and a hose hooked over the edge of the sink, or the outlet can, to quote English Electric, " be permanently connected to a suitable drain." A very sensible suggestion if only designers occasionally provided a suitable drain. The straightforward copper almost always has to be emptied into a bucket, and nearly all washing machines and spin driers have to have a pump (which adds to the cost) to lift the waste water over the edge of the sink. Why not a drain at floor level so that gravity can do the job? Presumably most architects' domestic chores are limited to a delicate twirl of the washing up mop.

The English Electric Co, Ltd, English Electric House, Strand, London WC2

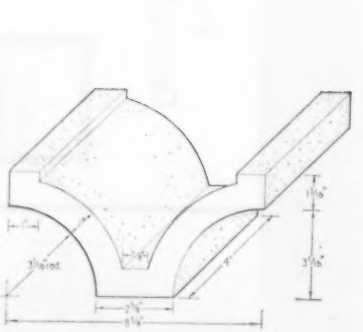
English Electric washing machine

SfB (15)

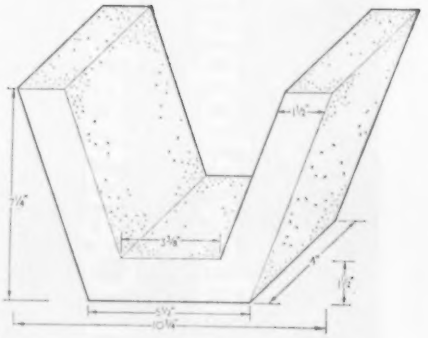
UDC 712·6

Screen wall units

Redland Tiles have just introduced Solaris screen wall units in two patterns. They are intended mainly for garden use, but there is no reason why they should not also be used for non load-bearing panels within the framework of buildings. One of the units is shown on the right, and this builds up into a pattern of linked



Type A Unit



Type C Unit

circles; there is another type which builds up into a series of hexagonal shapes, and is somewhat larger in scale. Both types are made in artificial stone and are available in five colours, and there is also a clay version made by Sussex & Dorking Brick. Price varies from 32s to 40s a square yard. The descriptive leaflet is A4 size and SfB classified.

Redland Tiles Ltd, Castle Gate, Reigate, Surrey

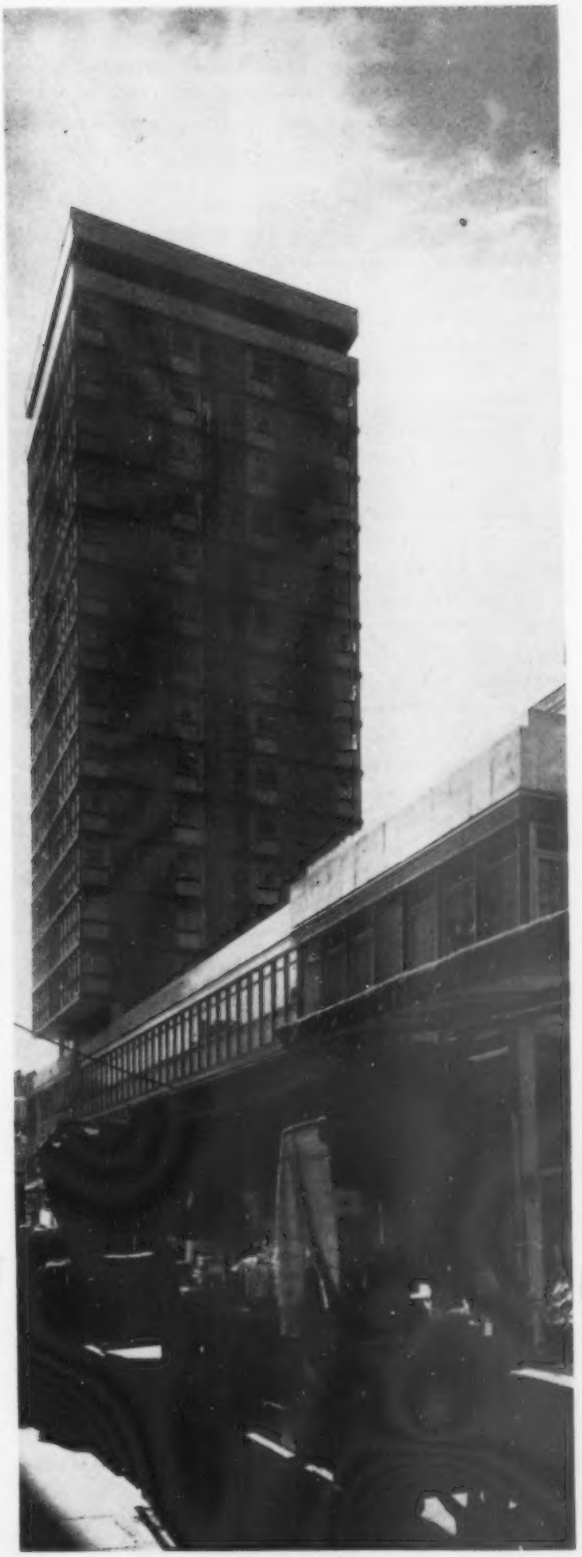
AJ SfB (92)

Building Study, 2nd series UDC 725·22
Shops and flats or offices

Mixed Development at Berwick Street Soho

for the WESTMINSTER CITY COUNCIL
designed by RICHES & BLYTHIN
quantity surveyors C. E. BALL & PARTNERS who prepared this analysis
consultants:
heating KENNEDY & DONKIN
structural R. TRAVERS MORGAN & PARTNERS

Soho, the cosmopolitan centre of London's night life, is also renowned for its outdated road system and largely obsolete property. Westminster City Council in sponsoring the design of a mixed development of shops, offices, and flats in Berwick Street have set a high standard which they hope future private enterprise property developers will emulate



The residential tower rises high above Soho giving light, air, and outlook to its occupants. In the foreground part of the Berwick Market

APPRAISAL

Walk down Berwick Street and the whole kaleidoscope of vigorous growth and decay which makes up the society and townscape of Soho is made apparent. It is an area in which large and small businesses crowd in upon each other (including stall-holders in the market) and yet the resident is not excluded.

Founded upon a centuries-old road pattern, growth over the years has been natural and every facet of life to be found within society is here. Unlike the City of London, Soho does not die at sunset, but continues its natural twenty-four hour cycle. For this reason it has a sense of community and (like Piccadilly Circus) an " image " over which people wax sentimental when any change is suggested. The community is important, the " image " is not.

Against this background the Westminster City Council decided to develop just under an acre of land adjacent to the traditional Berwick Street market. This land was declared a slum clearance area in 1955, and was later subject to compulsory purchase orders. It was to be the first scheme to follow the London County Council's suggestion for mixed development in central London, and one which would set a standard for future developments in the area.

The architects were set the problem of providing new shops to face on to the market, showrooms or offices, and flats. Plot ratios were to be 1 : 2 for commercial development, and 1 : 1·5 for residential development.

With these requirements and within the restricting envelope of daylight angles, the idea was developed of a three-storey podium to contain the shops and offices with a tower of residential accommodation above.

This has resulted in a successful relationship between the development and its enclosing environment. The podium as a whole relates well to the scale of buildings on either side, while the shops, under a wide unifying canopy, and offices above act as a sympathetic backdrop for the market. Above this, the tower rises high giving light, air, and outlook to its occupants while, by virtue of its slender mass, avoiding any feeling of " oppressiveness " at pedestrian level.

In the detailed planning of these elements, shops, offices, and flats together with their circulation areas are separated. Shops with their service areas and basement storage are self-contained units. The two office floors have their own lifts and staircases at two ends of the plan. A circulation core for the flats pierces these offices but affords no connection. The only common area is a car park for 25 vehicles in the basement intended to be used by all tenants (at an approximate rental of £2 a week).

In design the shops and offices provide an adequate enough shell for their function and stand or fall by the quality of shop fitting or office installation. Natural light in the offices is good, while skirting level ducting for electrical services and communications, together with regular lighting terminals in the ceiling slab provide for a flexible office layout. Heating is by sub-sill convector heaters which run the full length of window walls on the office floors.

A first impression of the residential accommodation as one enters at ground level off the Berwick Market is less favourable. Perhaps it is because the entrance hall lacks the vigour just experienced in the market outside. Colours are muted, while the waiting area adjacent to the lifts is small and in comparative gloom. The general atmosphere on this ground floor of the circulation core is repeated on each of the upper floors and comes in for some criticism by the tenants. It is a pity that a more silent (or better sound insulated) lift system could not have been planned for, and more light injected into the lifts lobby (the staircase while enjoying ample light is little used).

Once across the threshold of one of the two-person flats however the atmosphere changes. Here is a compact and well worked out plan (repeated four times on each floor from the fourth to the sixteenth) with living areas at the corners and kitchens and bathrooms bunched about service ducts at the centre of the north and south faces. Ceilings and walls generally are plastered and painted with large centre-pivot windows giving views over London. Floors are finished with thermoplastic tiles throughout. Central heating and hot water are provided in all flats from an installation in the basement.

At the third floor level a group of four bed-sitters gives inflection elevationally between the podium of offices and towers of two-person flats, while a further two bed-sitter units are provided on the seventeenth floor adjacent to the tank room and lift motors.

Any criticisms of these flats are minor, being concerned only with the standard of workmanship which in places could have been better. A high noise level in the flats on windy days is a general observation by tenants. This is a problem which has yet to be solved in low cost housing blocks of this height and general massing.

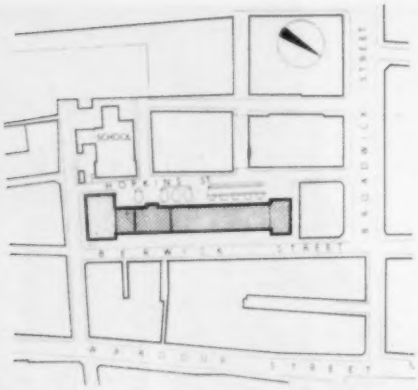
In terms of construction, the building consists of a reinforced concrete frame with " beamless slab " floors and roofs. Foundations, which bear onto gravel at a depth of about 8 ft below the basement floor, are of orthodox design except under the tower where the foundations of the columns and walls join up to form a raft. The basements of shops are tanked in asphalt, but for the remainder, containing the car park etc., waterproof concrete construction is used with a pve water bar at construction and contraction joints. The majority of the walls of the main elevation of the first and second floors and the east and west elevations of the tower are constructed in steel storey frames (including reversible windows) between galvanised pressed steel mullions. Generally speaking materials used to clad the structure are carefully chosen for their architectural effect and future weathering. In the three-storey podium a deep canopy unifies the shop fronts (not yet all of them are installed) being surmounted by the steel storey frame and a coating of reconstructed stone. Bands of black mosaic face the structural slabs, canopy fascia, and ground floor columns.

In the tower a similar character is maintained with the addition of yellow brick panels, while on the skyline the seventeenth floor and roof are expressed as two heavy bands of reinforced concrete faced with white mosaic. The overall effect of this detailed treatment tones in well with the Soho townscape.

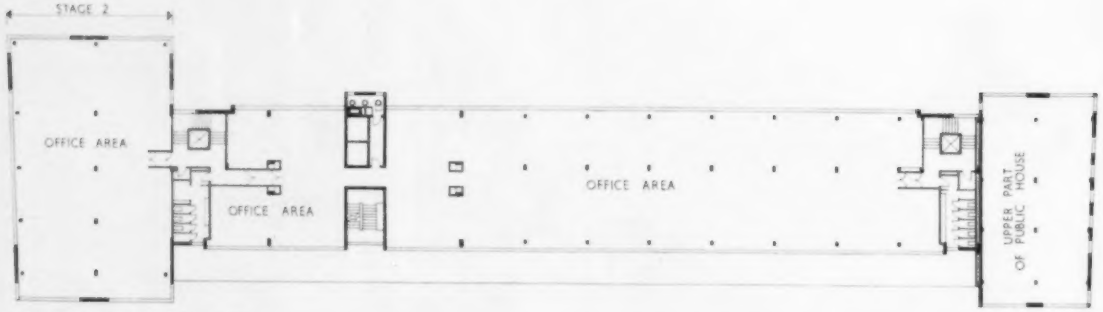
Considerable care has been taken to articulate at the junction of the two blocks, but the tower seems visually weak at its springing point on the third floor, especially when viewed against the strength of its " hat " at roof line. The current trend of introducing " built in bomb damage " on the skyline has, however, been avoided and this gives the tower a certain dignity.

Viewed in its widest context, this scheme sets a high standard for the many developments which will be taking place in Soho over the coming years. It is interesting to note, however, that acquisition of the site cost the Westminster Borough Council over a quarter of a million pounds per acre. With land prices at this inflated level, only action by a local government can initiate development of this nature in which local residents in the " lower income bracket " pay rents they can afford. Any future development by private speculators must be of a nature to take full advantage of sites in this valuable central area, and

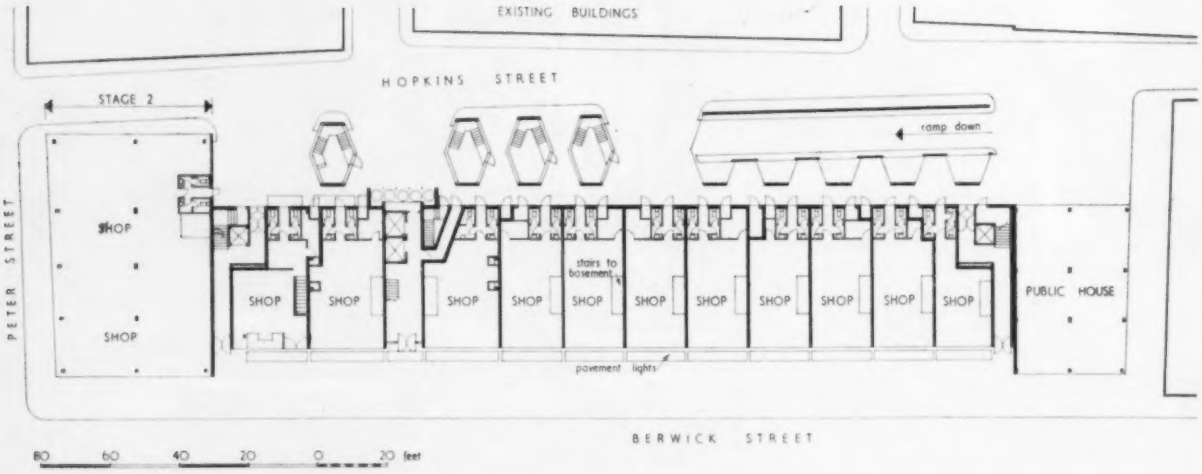
Looking south down Berwick Street towards the new development



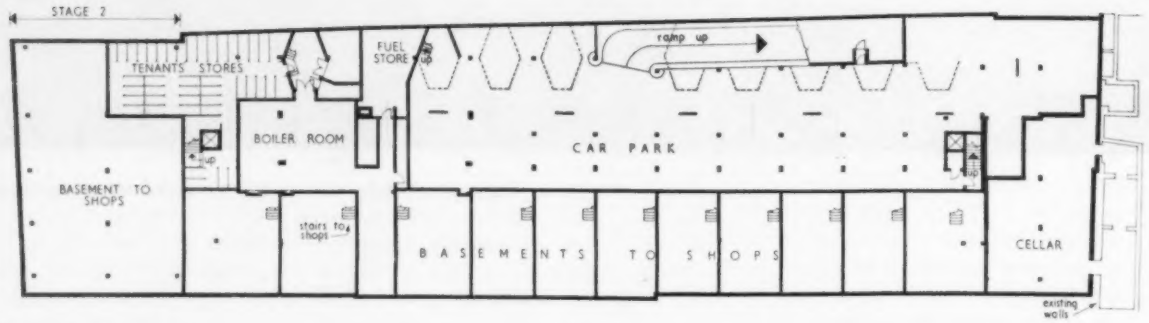
Block plan [Scale: $\frac{1}{64}$" = 1' 0"]



First floor plan [Scale: $\frac{1}{64}$" = 1' 0"]

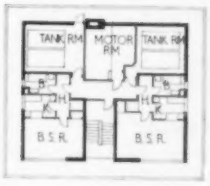


Ground floor plan

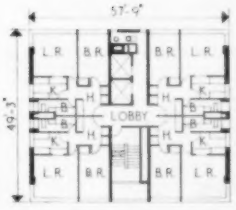


Basement plan

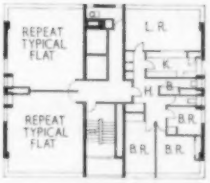
The development seen from Hopkins Street. In the foreground a ramp leads down to the basement car park



Plan at penthouse level of tower block

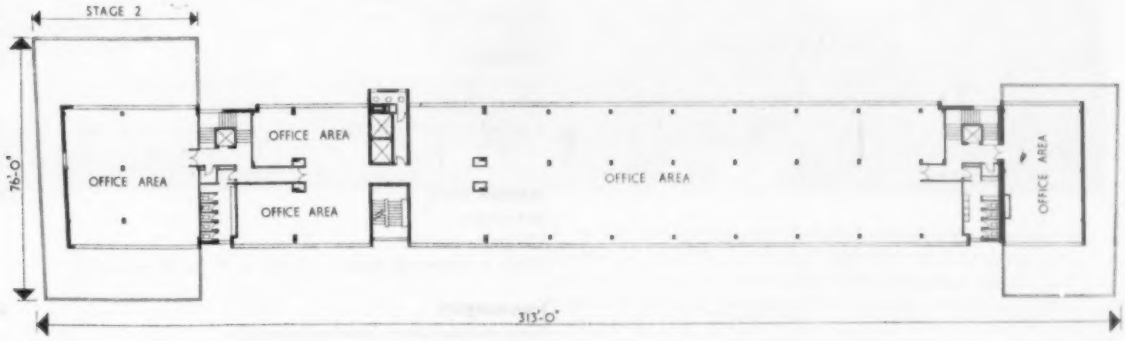


Plan of tower block with typical floor of one-bedroom flats



Plan of tower block showing alternative three-bedroom flat

Plan at roof level of three-storey block, with bed-sitting room flats



Second floor plan

this would necessarily mean the exclusion of residential accommodation of the type provided in the Berwick Street scheme. This raises the question as to the possibility of mixed development of this kind in this area without local government assistance. It would seem unpractical for a local government to subsidise such mixed development on a large scale. An answer to inflated land prices must be found if the centres of towns are not to become the exclusive domain of commercial development and luxury flats.

CLIENT'S REQUIREMENTS

The provision of a scheme of mixed redevelopment containing commercial accommodation in the ratio 1:2 and residential accommodation in the ratio 1:1.5, giving a final plot ratio of 1:3.5.

SITE

In the heart of Soho, London's most cosmopolitan area, on a site bounded by Berwick Street, Peter Street, Hopkins Street and Kemp's Court. The area is 0.81 acre gross, 0.59 acre net.

PLANNING AIMS

To provide the most advantageous use of street frontages for the use of shops and access to first and second floor office accommodation and to put residential accommodation in a position where it can benefit from good aspect and unrestricted light and air.

SUMMARY

Ground floor area: 14,400 sq ft.
Total floor area: 107,618 sq ft (includes 38,100 sq ft gross of residential accommodation, 29,120 sq ft being net habitable area).
Type of contract: RIBA with modifications.
Tender date: May 1959.
Work began: September 1959.
Work finished: May 1961.
Tender price of foundation, superstructure, installation and finishes including drainage to collecting manhole: £340,423 0s 0d.
Tender price of external works and ancillary buildings, including drainage beyond collecting manhole: £5,098 0s 0d.
Total: £345,521 0s 0d.

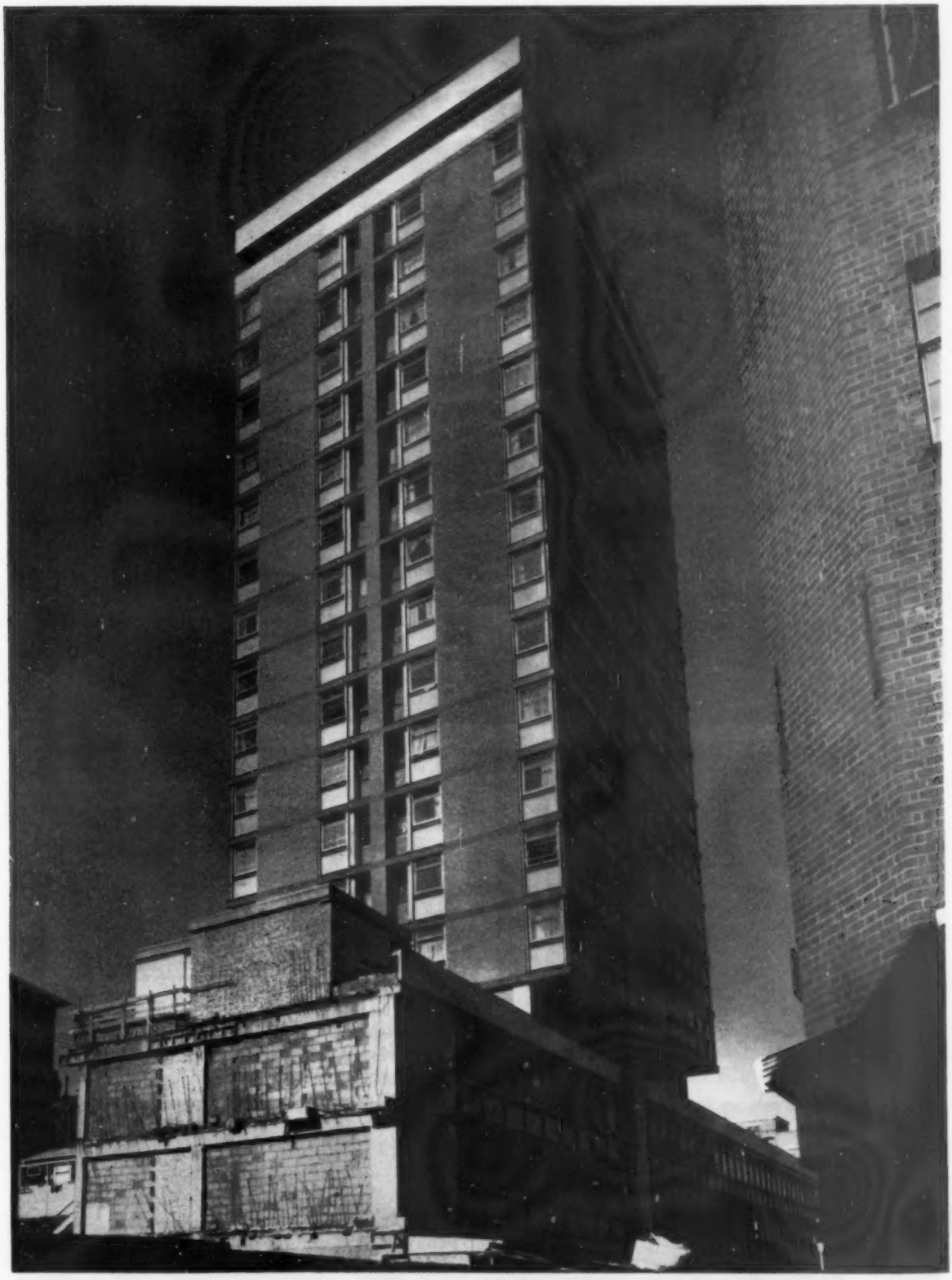
COST ANALYSIS

Based on tender. (AJ revised elemental breakdown in use from November 10 1960.)

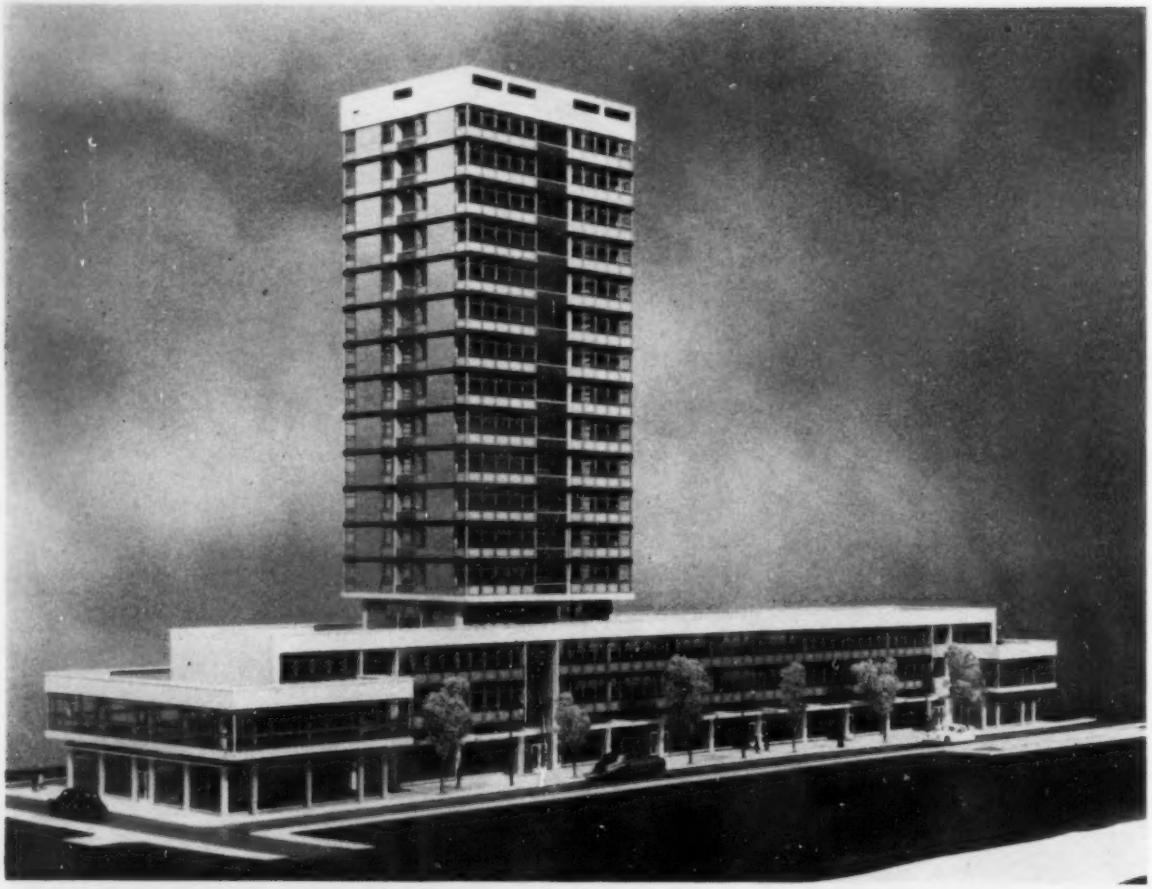
	Cost per sq ft s d
Preliminaries and insurances 3·27 per cent of remainder of contract.	2 2
Contingencies	1 10
Work below lowest floor finish Mass concrete foundations under columns, reinforced concrete floor slabs, all laid on 3-in concrete blinding Raft foundation to tower block. Includes 10d for demolition.	7 1½

STRUCTURAL ELEMENTS

Frame Reinforced concrete columns and beams.	5 11½
Upper floors Reinforced concrete beams and hollow pot: 8,350 sq yd, 62s 9d per sq yd.	4 10½
Roof Reinforced concrete and hollow tile slabs finished with cork slab insulation, building paper, cement and sand screed, hessian reinforced bituminous felt roofing, topped with 1-in concrete slabs, joints filled with bituminous compound; 1,600 sq yd, 127s 6d per sq yd. Canopy, reinforced concrete slab, finished with asphalt, 216 sq yd, 151s 3d per sq yd.	2 5¾
Staircases One 4 ft 0 in wide × 160 ft 0 in total rise. Two 4 ft 6 in wide × 35 ft 0 in total rise. Reinforced concrete finished in terrazzo or granolithic with mild steel balustrades and handrails.	11
External walls Curtain walling in storey-height units of galvanised steel, infilling panels of vitreous enamelled steel backed with asbestos cement insulating sheets; 2,088 sq yd, 275s 9d per sq yd. 11-in cavity brickwork; 5,560 sq yd, 50s 2d per sq yd. Reinforced concrete basement walls, tanked in asphalt; 1,220 sq yd, 92s 7d per sq yd.	8 7¾
Windows Galvanised steel including infilling panels of vitreous enamel, centrally pivoted opening lights; 7,800 sq ft, 23s 5d per sq ft.	1 8
External doors 33 single. 4 pairs double. Exterior quality flush in softwood frames: 740 sq ft, 16s 6d per sq ft.	1½
Partitions 2½ in hollow clay; 4,572 sq yd, 9s 9d per sq yd. 3-in hollow clay; 221 sq yd, 11s 0d per sq yd. 4-in lightweight concrete blocks: 471 sq yd, 16s 4d per sq yd.	1 7
Internal doors 334 single. 130 pairs double. Flush in softwood frames; 12,060 sq ft, 8s 2d per sq ft.	11
Ironmongery Satin chrome lever handles generally.	5
Total of structural elements: 27s 7d	



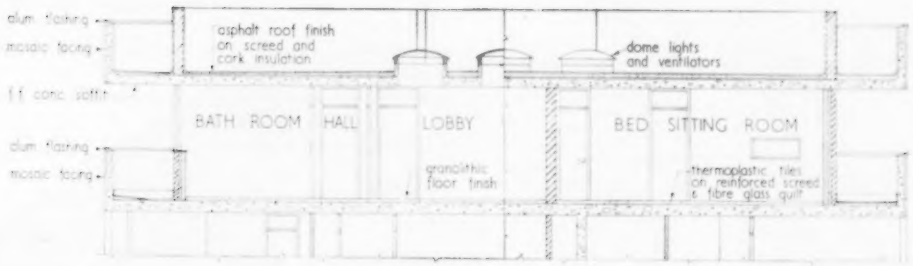
Work had to be phased so that a public house at the south end of the site could continue operation until alternative premises were completed within the new building. The photograph shows temporary enclosure for office floors awaiting completion of the development



Above, model showing the complete scheme. The south end of the block, on the left, is currently under construction as a second stage

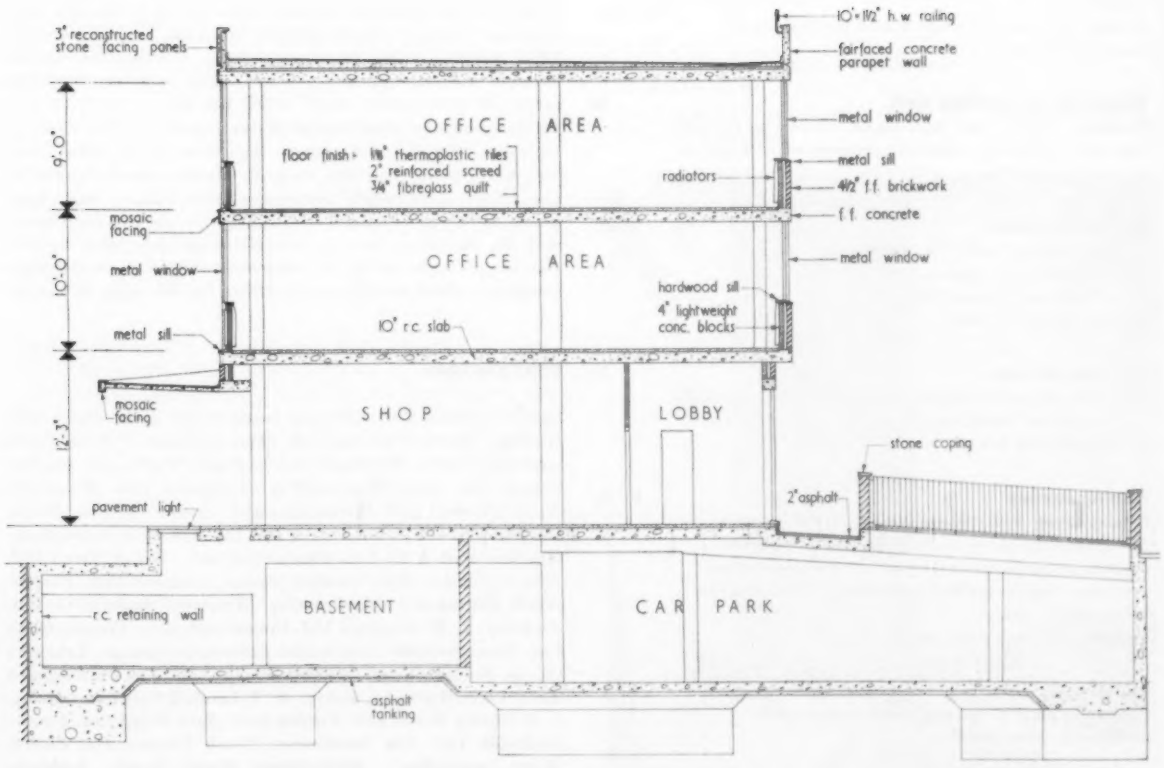
Left, a detail of the tower at its junction with the three-storey podium of shops and offices. Facing materials have been chosen for their good weathering qualities in addition to considerations of texture and colour

Below, a wide canopy will unify shop fronts when these are installed. Above this, the two floors of offices act as a neutral backdrop to the market



Section through penthouse

Section through typical floor in tower block



Section through office block and basement **[Scale: $\frac{1}{32}$" = 1' 0"]**

FINISHES AND FITTINGS

Wall finishes — s 1 d 0
2-coat plaster; 12,400 sq yd, 5s 9½d per sq yd.
Cement cold glaze in staircases; 905 sq yd, 17s 7d per sq yd.

Floor finishes — 2 7
Thermoplastic tiles generally in offices and flats, on cement and sand screed, wire reinforced, on glass wool quilt, softwood skirtings; 5,345 sq yd, 24s 10d per sq yd.
Terrazzo in wcs and on landings, terrazzo skirtings; 263 sq yd, 99s 0d per sq yd.

Ceiling finishes — 8½
2-coat plaster; 6,337 sq yd, 8s 4d per sq yd.

Decorations — 1 6
Gloss paint on softwood and metal windows, emulsion paint on walls and ceilings. Includes glass mosaic on exposed external faces of concrete slabs; 553 sq yd, 146s 4d per sq yd.

Fittings — 9½
Shelving, kitchen fittings and cupboards in flats.

Total of finishes and fittings: 6s 6½d

SERVICES

Sanitary fittings — 8½

Type	*No of each type*
Washbasins	103
Sinks	61
Baths	57
Wcs	99
Urinals	4

Fittings generally in white glazed fireclay, steel enamelled baths.

Waste, soil and overflow pipes — 5½
Wastes in copper, cast iron stacks. All fittings provided with anti-siphonage pipes and pressure relief branches to main soil stacks.

Cold water services — 10
Separate storage tanks for tower and three-storey block. Services in copper.
No. of draw-off points: 320
Includes builder's work.

Hot water services — 7½
Four 300-gallon calorifiers, two serving flats, remainder in three-storey block, supplying 230 draw-off points.
Includes builder's work.

Heating services — 6 2½
2 boilers fired with 960 sec fuel oil. Total heat load, 4,000,000 Btus per hour. Storage for 4,000 gallons.
Wall panel radiators in flats and continuous sill-line convector heaters on first and second floors. Heated towel rails in flats.
Includes builder's work, 6d.

Gas services — 1
Outlets to flats, shops and public house: 243.
Includes builder's work.

Electrical services — 3 2
Flats: 376 lighting, 437 power and 57 cooker points.
Offices: 56 lighting and 2 power in stairs, wcs etc., conduit only provided elsewhere.
External: 10 lighting points.

Special services — 5 3
Two 8-person lifts in tower, two 4-person lifts serving offices, 3s 5½d.
Refuse chute in tower block, concrete pipe with cast iron hoppers, 2½d.
Sprinkler system in basement and provision for ground floor and offices if required, 1s 6½d.
Lightning conductors, 1d.

Drainage — 8½
Combined system in cast iron.

Total of services: 17s 11¾d

External works — 11½
Concrete paving slabs, mild steel railings, bollards and service connections.

Total per sq ft of floor area:
£340,423 (net cost excluding external works) = 63 3
107,618 sq ft (measured inside external walls)

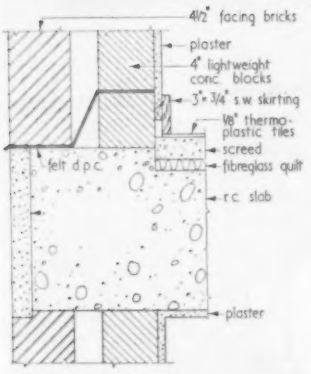
COST COMMENT

Because this is an analysis where different functions are grouped together under the elemental headings, deductions from it can only be made with considerable caution. The shops, for instance, are mere shells as far as the building contract is concerned, and are giving a favourable bias towards a low cost of finishes. To a lesser extent, the same thing is happening with the offices, where tenants are left to provide such items as partitions and light fittings. The scheme is still, however, a useful indication of the cost of this type of mixed development.

Certain design decisions emerge from the analysis, the most important being a general tendency to equate the domestic and office accommodation as far as possible. For instance, similar external walling and windows have been used on the tower as on the three-storey block, which has become a major item for the residential accommodation, bearing in mind the relatively high ratio of wall and window to floor area. On the other hand, no great attempt has been made to provide better finishes for the offices, particularly sound-absorbent ceilings and quiet floors. However admirable the concept of architectural unity may be, therefore, there is no evidence to show that separate cost targets were set for the residential and commercial accommodation, which would seem desirable for this type of scheme.

CONTRACTORS

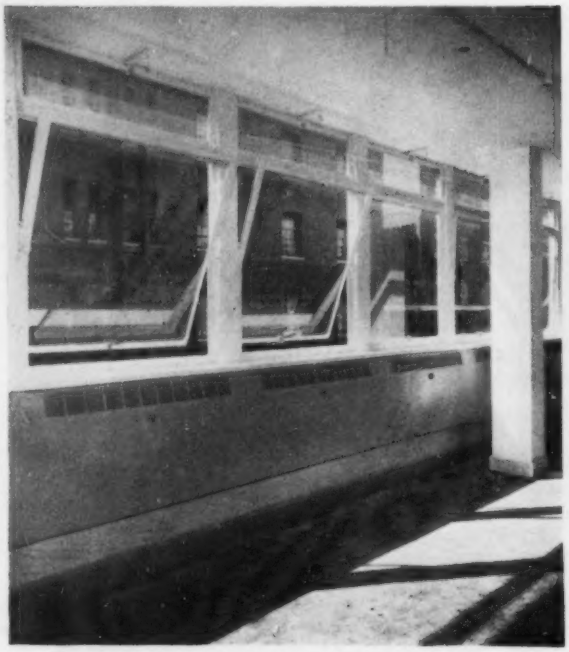
General: Wates Ltd. *Electrical installations:* J. H. Plant Ltd. *Heating:* Norris Warming Ltd. *Metal windows:* Crittall Manufacturing Co Ltd. *Reinforced concrete frame:* Wates Ltd. *Roofing:* Frazzi Ltd. *Lifts:* Hammond & Champness Ltd. *Metalwork:* Smith (Horley) Ltd. *Precast stonework:* Shockcrete Ltd. *Mosaic and terrazzo:* W. B. Simpson & Son Ltd. *Sprinkler installations:* Matthew Hall & Co Ltd. *Plastic handrails:* Safety Tread Ltd. *Doors:* Gliksten Ltd. *Sanitary fittings:* Stitsons Ltd. *Thermoplastic flooring and asphalt paving:* Neuchatel Asphalte Co Ltd. *Painting:* J. H. Kenyons Ltd. *Cement cold glaze:* Cement Glaze Ltd. *Pavement lights:* Luxfer Ltd. *Lettering to signs etc:* Lettering Centre. *Sewage pumps:* Wallwin Pumps Ltd. *Fire-resisting steel doors:* Clark Hunt Ltd. *Bricks:* W. T. Lamb & Sons Ltd. *Glazing:* J. H. Hetley & Son Ltd. *Kitchen units:* John Dight Ltd. *Paints:* Hadfields Ltd. *Gas installation:* North Thames Gas Board. *Water installation:* Metropolitan Water Board. *Lightning conductor:* R. C. Cutting Ltd.



Detail of solid walling at intermediate floor levels, finished with mosaic **[Scale: 1" = 1' 0"]**

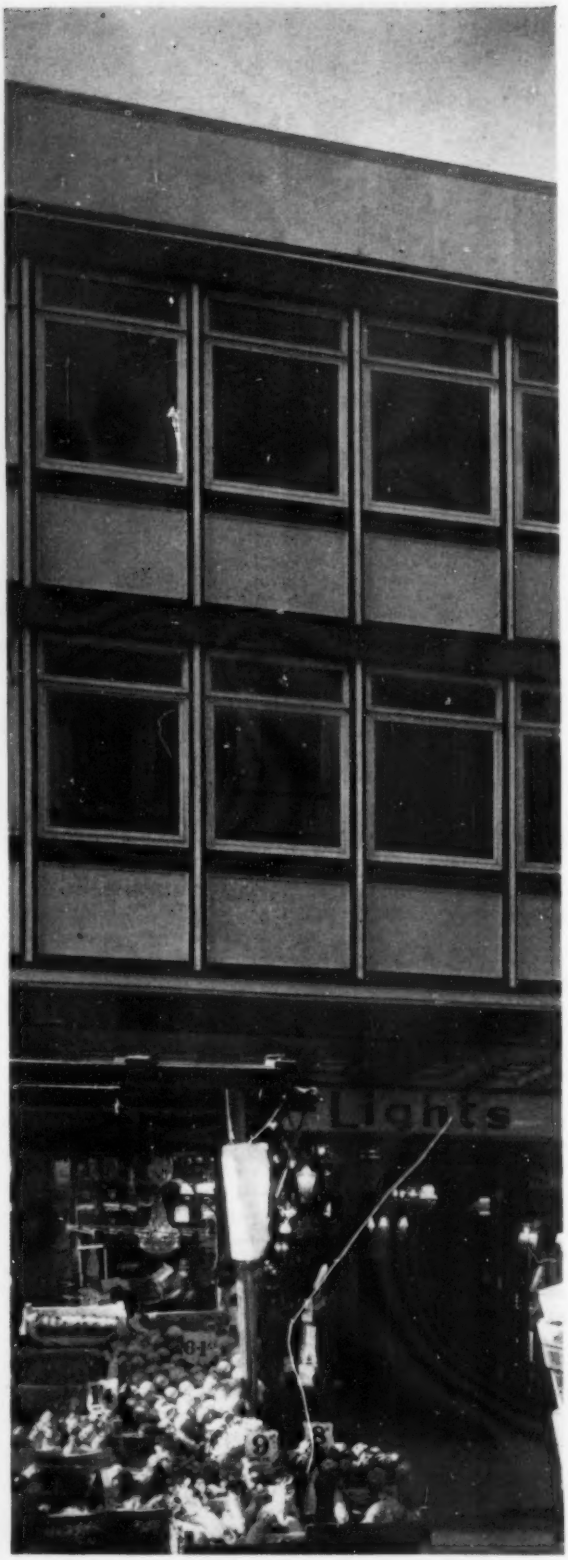
The east face of the residential tower. "Flying" beams which span the staircase element and which could be disposed of structurally, indicate some uncertainty in the expression of the plan form

The tower seen from a promenade area over the shops and offices. The intention of the architects at sketch design stage was to develop this roof area with planting and seating. This was later omitted in order to effect economies

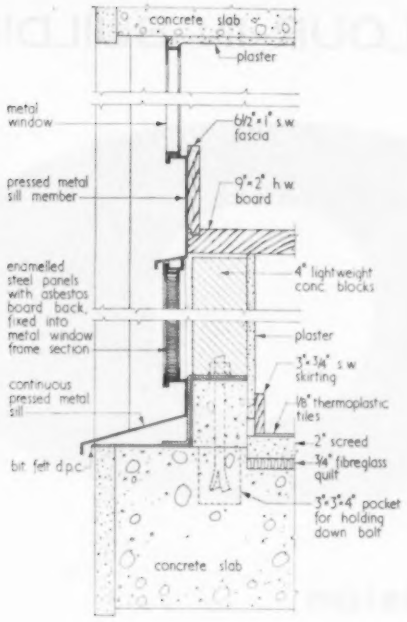


Centre-pivot reversible windows with hopper-type ventilators on the office floors. Sub-sill radiators have localised control on each module. A skirting level duct carries electrical services and communication systems

The lift lobby with access to the refuse chutes beyond. This is the least satisfactory part of the residential tower in terms of light, area and finishes

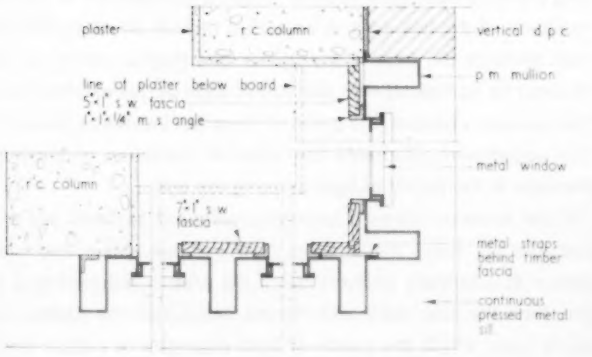


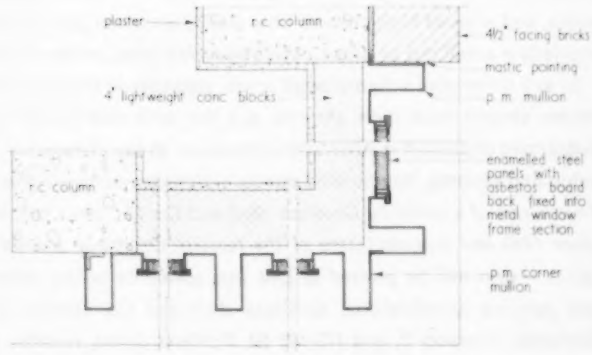
One of the few shops as yet in operation is seen beyond stalls in the market. These shops are welcomed generally by the stallholders as attracting further custom to the area



Section through windows to offices

Openings in the ground floor slab to the rear of the shops provide light and air for a car park in the basement

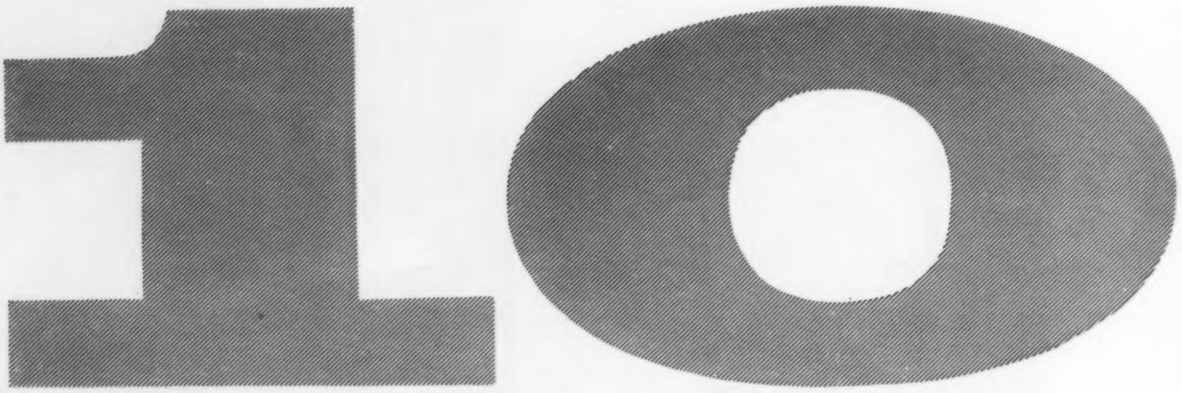




Plans of office windows above and below sill level [Scale: 1" = 1' 0"]

Entrance doors to the residential tower facing on to Berwick Market. Shops on either side are yet to be occupied

THE LOGICAL USE OF COLOUR IN BUILDING



The eye—limiting the field of vision

The eye is the instrument by which the energy reflected by coloured surfaces is received by man, and upon the properties of this instrument our colour reception depends.

An interesting experiment, which anyone can perform, can be made by setting up a series of panels coloured in various ways. In the absence of panels a large patch of blue sky, or green grass, suffices. If the panels (or sky or green grass) are looked at through a tube about one to three inches in diameter, and two to three feet long (keeping both eyes open to enable a comparison of the colour reception of the two eyes to be made) then in all cases the colour seen through the tube is the lighter one (higher value and lower chroma) as compared with the colour seen by the unprotected eye. The hue also changes, the green of the grass becoming bluer in hue. This experiment illustrates the effect of limitation of the angular diameter of the pencil of light entering the eye.

If the observer views a uniformly coloured surface, say a wall, that fills his entire visual field, then the hue, value and chroma remain substantially uniform, but if the area is reduced to a small one, then the hue, value and chroma depend on the portion of the retina upon which the pencil of light impinges or colour changes with eye movement. If the area becomes small, even with maximum (cone) photopic vision, a small high chroma yellow object becomes white, and a small high chroma blue object becomes grey or black; similarly a small red or green object becomes grey, white or black.

In any decorative scheme small areas, particularly textured colour areas, should have high chroma, but the area that is the angle subtended at the eye is often critical because of the changes in hue, value and chroma, enumerated above, which can occur in practice.

AJ SfB (14)

Roads and Pavings : General

Ralph Iredale, the author of this week's Element Design Guide and technical study, is an architect member of the development group at the War Office (Director-General of Works, Donald Gibson, CBE). He has previously worked on the development of CLASP with the Notts. County Council and on the rebuilding of Coventry.

(14) *Roads and pavings: General*

This Element File gives the procedure and information for the design of all hard surfaces to be laid on the ground which provide for the movement of vehicles and pedestrians. It does not include bridges or paved surfaces laid on another structure.

The Element Design Guide giving the procedure, considerations and references for the design of roads contains appendices giving definitions, plant types, and the names and addresses of trade organisations. It is accompanied by a Technical Study on the structural design of roads. There are also five Information Sheets included in the Element File. These give details of parking arrangements, road junctions and turning circles, an explanation of the use of the Californian Bearing Ratio in design and construction, data on movement joints and on pavement surfacings.

The references used are largely drawn from Government publications and are readily available. The Element Design Guide and technical study were submitted to the Road Research Laboratory and their suggestions have been incorporated.

AJ **SfB (14)**

Element Design Guide **UDC 625·8**
Roads and Pavings : General

(14) Roads and Pavings : General

Bibliographic references (third column) are graded as follows:
* General reference of value to every architect and which he may wish to possess
** Specialised reference normally used by consultant or architects with special knowledge of particular aspects of building
*** Highly specialised references and research papers which would not be of value to the architect unless working with a consultant
Figures in square brackets are sfb references to the publications. References in **bold type** are to AJ Element Files

Data required

1 **Assemble general data on site and environment**	*Obtain:* Ordnance Survey GEOLOGICAL MAP AERIAL PHOTOGRAPHS	**Element Design Guide** **SfB(11) Ground: General** *paras* 1–7
	Visit site and note: uses to which site and adjacent sites are put Physical features including: PLANTING DITCHES MOUNDS ROCK OUTCROPS PATHWAYS BUILDINGS RAILWAYS VIEWS—in and out Evidence of: SUBSIDENCE HIGH WATER TABLES AREAS LIABLE TO FLOOD LYING WATER	*Object: to highlight any particular information to be recorded at time of detailed survey, and to form a general impression of problems to be encountered in layout design*
	Record names and addresses of: LOCAL AUTHORITY OFFICES clerk planning officer surveyor/engineer PUBLIC UTILITIES drainage water gas electricity GPO telephones traffic commissioner Ministry of Transport ADJOINING OWNERS/OCCUPANTS	
	Record any easements, rights, covenants or other injunctions relating to both site and adjacent sites	*Advise adjoining owners/occupants that a survey is to be carried out and obtain consent to enter their land where necessary. This information should be obtained through the client's solicitor or, if client is a local authority, from the clerk of the council*
2 **Assemble copies of legislation**	Local by-laws and regulations National legislation	From local authority surveyor Model Byelaws Part IV D (reprinted 1958) HMSO [Aa6] ROAD TRAFFIC AND ROADS IMPROVEMENT ACT, 1960 HMSO [Aa5] NEW STREETS ACT 1951 (reprinted 1958) HMSO [Aa5] NEW STREETS ACT 1951 (amendment) Act 1957 HMSO [Aa5] Streets: schedule of suggested mini-

		mum street widths for carriageways and footways of new streets 1951 HMSO [(14)] PUBLIC UTILITIES STREET WORKS ACT 1950 HMSO [Aa5] SPECIAL ROADS ACT 1949 (reprinted 1957) HMSO [Aa5]
3 **Carry out detailed survey of site**	Record following information: bench mark or other permanent datum levels ownership limits, including responsibility for maintenance of boundaries	*Information should include manhole and inspection chamber sizes, cover levels, invert levels, sizes and/or loadings directions of supply, which can be obtained by inspection or consultation with local authority, statutory undertakers and adjoining owners*
	SERVICES land drains surface water drains sewers water mains gas mains electricity supplies *underground* *overhead* telephone cables *underground* *overhead* buried pipes *steam* *oil*	
	PHYSICAL FEATURES quarries pits mounds ditches streams ponds	
	PLANTING hedges trees marshlands	*Including heights, spreads, diameters of trunks, condition. Note should be made of specimens or groups scheduled under a tree preservation order, the information being obtained from the local planning authority*
	BUILDINGS	*Ownerships to be recorded.* *Note buildings scheduled as of architectural or historical interest. Information obtainable from local planning authority*
	UNDERGROUND WORKINGS	*This information can be obtained from the mineral valuer who will refer to the National Coal Board, or other appropriate authorities*
4 **Photograph site**	Record viewpoints	
5 **Initiate soil investigation**	Soil stratification Subsoil variation over site Chemical composition including: *acids* *alkalis* *sulphates* Water table	**SfB Ground: General** para 8 et seq *This information will provide a detailed check of general information previously obtained from reference to the geological map. Trial holes should be at least 3 ft below formation level and are best carried out in winter when signs of flooding and high water table are most apparent*
	Record positions of trial holes and/or bores on the site survey	BRITISH STANDARDS INSTITUTION **CP2001:1957 Site investigations [Ca1] **BS 1377:1948 Methods of test for soil classification and compaction [Ca3]
	Determine type and strength of soil	**BS 410:1943 Test sieves [Bb9] *BEAZLEY, E.: The design and detail of space between buildings, Table p 25,

London, 1960, Architectural Press [(14)]

**ROAD RESEARCH LABORATORY (RRL) Technical Paper 40: A review of existing methods of road construction over peat. J. O. Tressider, 1958. HMSO [Ab5] Technical Paper 11. The effect of the soil foundation on the road surface. D. J. Maclean, 1948. HMSO

Classification of soil types according to their susceptibility to movement, assuming that compaction and water content are at optimum

Very susceptible
(to non-uniform movement)
Galt clay
Heavy clay (main clay deposits of the south)
Sub-grades with pockets of peat within 15 ft of surface
Normal
lighter clays, lias clays
alluvial deposits, silty clays
sandy clays
fine sands
sandy gravel, gravel
Very stable
solid rock
well-graded compacted gravel with a CBR of at least 100 per cent

Determine strength of soil in terms of its Californian Bearing Ratio (CBR)

Laboratory tests will be necessary for public roads but are uneconomical for small private access roads
A majority of soils have CBRs between 3 and 15 per cent and designs should be based on the poorest present. In-situ tests should be made when the sub-grade is in worst condition of moisture content and density likely to occur during the life of the road. Laboratory tests should be carried out by experienced laboratories. A minimum of six specimens will be required. Each sample is likely to cost £5, plus cost of site inspections and preparation of samples. Even on small jobs, total might come to £200
ROAD RESEARCH LABORATORY, Road Note No. 29 HMSO [Ab5]

6 Consult local authorities

PLANNING OFFICER
development plan
existing and future developments
access points
vehicle routes
pedestrian routes
miscellaneous planning items

SURVEYOR/ENGINEER
availability of materials
sub-base
base
surfacing

Sand/gravel pits (concrete)
Steel works (slag)
Gas works (tar) etc
RRL. Sources of road aggregate in Great Britain (in collaboration with the Geological Survey and Museum) London 1960 HMSO 3rd edition [Db]

local traditional materials and availability of craftsman to carry out work

BEAZLEY, p. 22 [(14)]

general contractors
local authority

Determine if his department would tender for the work and/or maintenance and whether he will recommend to his committee taking over the roads by the local authority on completion

	proposed alterations adjacent to site to *roads* *drains* *street lighting* design requirements: surface water drains *sizes* *connections* width of *carriageways* *footways* *footpaths* *highways* *cycle tracks* dimensions of lay-bys sight lines junctions with roads maximum length of culs-de-sac maximum distance for pedestrians access crossfalls cambers gradients radii constructions/specification PUBLIC UTILITIES water board gas board electricity board GPO telephones	Local bye-laws *With regard to future extension of services, sizes/loads, points of connection, any special requirements*
7 **Establish user information**	Determine kind of user PEDESTRIAN school children people with prams old people CYCLISTS VEHICLES public service heavy goods service private Determine kind of use: PRIVATE PUBLIC FREQUENCY/LOADING PARKING	Schedule of suggested minimum street widths for carriageways and footways of new streets: HMSO 1951 [(14)] *Parking of bicycles, cars and other vehicles:* BEAZLEY, p 202 et seq [(14)] *E&OE 'Planning' The Architects' Handbook. London, 1959, Iliffe & Sons Ltd. 8th edition [Bb] *Traffic intensity:* *RRL Road Note 20 p 10 Construction of housing estate roads using granular base and sub-base materials, 1955, HMSO [(14)] BEAZLEY, p 28 [(14)] *CP 2006:1960 Traffic bearing structures. Pavings [Ab5]
8 **Establish cost allocation**	Carriageways and lay-bys Footpaths Footways Parking areas Paved areas Cycle tracks Lighting	*These figures will be determined within context of whole project, and will form part of the allocation to external works. The proportion will be influenced both by user information and by local availability of materials and labour*

Basic design decisions

9 **Determine basic design**	On basis of user requirements and the design criteria required by the local authority determine: WIDTH OF carriageways footways footpaths highways cycle track DIMENSIONS OF LAY-BYS SITE LINES CROSSFALLS	*Local authority requirements will affect the design of public roads. For private roads selection will be made by the architect from user, cost and site factors already outlined above* **RRL Road Note 26: Guide to engineers on the making up of private roads HMSO 1960 [Ab5] AJ Information Sheet No 1011, Road junctions and turning circles [(**14**)]

	CAMBERS GRADIENTS RADII MAXIMUM DISTANCE FOR PEDESTRIAN ACCESS JUNCTIONS WITH MAJOR ROADS CONSTRUCTION/SPECIFICATION REQUIREMENTS MAXIMUM LENGTH OF CULS-DE-SAC	AJ Information Sheet No 1011 [(**14**)]
10 **Consider form of construction**	USER REQUIREMENTS COST SITE FACTORS AVAILABILITY OF MATERIALS	CP 2006: 1960 [Ab5] RRL Road Note No 29
11 **Decide form of construction**	FLEXIBLE (GRANULAR) BASE PAVEMENTS RIGID BASE PAVEMENTS	BEAZLEY, p 28 et seq [(14)] *HOUGHTON-EVANS, W. Minor roads and external pavings, 2, sub-base and base, Arch J, 1959, 130 (3371) (November 26) p 586 [(14)] *RRL Road Note 5: Types of road surfacing and maintenance using tar or asphaltic bitumen, A. R. Lee, HMSO, 3rd edition, 1958 [(14)] BEAZLEY, p 56 et seq [(14)] HOUGHTON-EVANS, W. Concrete base roads, Arch J, 1960, 131 (3381) (February 4), p 212 [(14)]
12 **Flexible (granular) base pavements**	Assess implications, including costs of flexible (granular) base. Record: TYPE OF SOIL TRAFFIC CLASSIFICATION TRAFFIC INTENSITY (commercial vehicles per day) 0–15 exceptionally light 15–45 very light 45–50 light CBR OF THE SOIL	RRL Road Note 20, p 10 [(14)] (mainly for housing estate roads) BEAZLEY, p 30 et seq [(14)] *Type of housing estate road* *Culs-de-sac and roads on small estates* *Minor through roads on housing estates carrying no public service vehicles* *Through roads on housing estates carrying up to 50 public service vehicles per day* HOUGHTON-EVANS, W. Minor roads and external pavings, 1, introduction, the sub-grade, Arch J, 1959, 130 (3369) (November 12) p 502, and appended graph [(14)]
13 **Determine the design of the flexible pavement on basis of the CBR and the traffic**	Select the design chart to be used according to traffic classification (Road Note No 29) Note the thickness of surfacing and base to be used Determine thickness of sub-base from the intersection of the design curve with the CBR of the subgrade	RRL Road Note 29 RRL Road Note 20 *The total thickness of construction required by the design charts 1–4 of Road Note 29 is equivalent to that indicated by the appropriate CBR design curves shown in Fig 5 of CP 2006:1960, and as Fig 2 of Road Note 20. For roads less heavily trafficked than those considered in Road Note 29, the overall thickness can be determined from Road Note 20 but the thickness of surfacing and base recommended in chart 4 of Road Note should be used. In applying the results obtained from the design curve, ensure that thickness of base and sub-base are above the minimum necessary for the handling and compaction of the materials used* AJ Information Sheet No 1012 gives an example of determining the thickness of the pavement by the CBR method [(**14**)]
14 **Select sub-base material**	HARDCORE: ashes (NOT 'Fly' ash) gravel (low quality) crushed brick concrete rubble shale (burnt colliery shale) clinker	*To be granular materials, neither powdery nor too coarse, chemically inert, unaffected by water. The materials mentioned, although not all susceptible to the CBR test, will provide bearing capacities in excess of the 15 to 20% CBR values required by Road Note 29,*

	quarry waste sand	*Local availability will largely determine choice*
15 **Select base material**	To have an adequate bearing capacity when compacted, to be inert, unaffected by water or frost	**BS 812:1960 Methods for sampling and testing of mineral aggregates, sands and fillers [Db] *RRL Road Note 8 Some cases of frost damage to roads, D. Croney 1949 [Ab5] *RRL Road Note 14 Prevention of wet weather damage to surface dressings (2nd edition) 1955 [Ab5] Publications of the Limestone Federation, Manfield House, 376/9 Strand, WC2 and the British Slag Federation, 1 Catherine Place, London SW1
PITCHING OR " TELFORD " BASES	5–9 inch stones hand-packed on broader ends, and blinded with knapped smaller material. Probably too expensive Hard bricks from demolitions could be used similarly	*MINISTRY OF TRANSPORT, Specification for Roads and Bridgeworks (1957) clause 811 BS 812:1960 [Db]
HARDCORE OR " MACADAM " BASES	Hard angular stone Shale Hoggin Hard brick rubble	Lower quality bases particularly suitable for housing estate roads
	Slag (*Well graded and reasonably free from dust; maximum size to be less than base thickness*)	**BS 1047: 1952 Air cooled blast furnace slag coarse aggregate for concrete [Db3]
WET MIX	Crushed stone, or slag, graded from 2 inches down, mixed with water to render it suitable for placing by a mechanical spreader; mix to be dry as workability will permit; weather conditions must be favourable; base must be dry before surfacing to avoid frost damage of surface or failure of sub-grade; dressed to finish profile	**RRL Road Note 16 Bituminous surfacings made by the wet aggregate (hydrated lime) process; compositions of wearing courses and base courses, recommended for trial use in the construction and maintenance of roads 1953 [Ab5] *BRITISH GRANITE AND WHINSTONE FEDERATION (BGWF) Publication INF/3 Wetmix 1960 [Ab5] *MOT, Specification for Roads and Bridgeworks (1957) clause 807
DRY-BOUND MACADAM BASES	Single size crushed stone of nominal size 1½ or 2 inches blended with fines and compacted by vibration	*MOT, Specification for Roads and Bridgeworks, clause 808
LEAN MIX BASE	Lean concrete 1:18-24 with all-in aggregate (1½ inches down to sand); used similarly to wet mix; hand placing or mechanical spreading possible	BRITISH GRANITE AND WHINSTONE FEDERATION, Publication INF/3, Wetmix 1960 [Ab5]
COATED MACADAM BASE		FEDERATION OF COATED MACADAM INDUSTRIES Technical Literature
SOIL CEMENT BASE	Obviates necessity of importing large amounts of material: prices as low as 5s 0d per yard super not uncommon	***RRL Road Note 28 The determination of the cement or lime content of cement or lime-stabilised soil 1960 [Ab5] *CEMENT AND CONCRETE ASSOCIATION Lean concrete and cement bound granular base materials 1960 [Eq4]
	Establish whether soil is suitable for treatment by:	*Likely to be particularly suitable for housing estate roads*
	SOIL SURVEY obtain soil samples by hand auger or trial pit from depths of proposed formation, at 100 ft intervals if sub-soil is variable or 300 ft intervals if consistent	**RRL Soil mechanics for road engineers HMSO 1952 [Ca] BS 1377:1948 [Ca3] *BS 1924:1957 Methods of test for stabilised soil [Ca3] *CP 2003:1959 Earthworks [C]
	Light sandy soils, coarse boulder gravels — most suitable silts, silty clays, peats, highly organic soils — difficult to stabilise	RRL Technical Paper 40 [Ab5]
	LABORATORY TEST	
	SITE TEST	*MINISTRY OF AGRICULTURE, FISHERIES AND FOOD Fixed equipment for the farm No 19 Soil Cement Roads HMSO [(14)] Arch J, 26 November 1959, p 587 [(14)]

	Establish method of stabilisation: mix-in-place plant mix (*where native soil unsuitable and imported material necessary*)	BEAZLEY p 43 [(14)] Arch J, 26 November 1959, p 587 [(14)] *RRL Road Note 15 Specifications for the construction of housing estate roads using soil cement HMSO [(14)]
16 **Design base thickness**	Six inches is generally satisfactory Heavy cohesive soils may require the addition of coarser granular material	
17 **Consider and select surfacing**	For protection of structure from surface water provision of good non-skid riding surfaces freedom from glare pleasant appearance durability	HOUGHTON-EVANS, W. Minor roads and external pavings, 4 surfacing trim. Arch J, 1960, 131 (3383) (February 18) p 297. [(14)] BEAZLEY p. 35 [(14)] RRL Road Note 5 [(14)] *BS 1521:1949 Waterproof building papers [Lj2]
18 **Consider and select surfacing for flexible bases**		*Technical literature from:* The British Granite and Whinstone Federation, 55/58 Pall Mall, St. James, SW1
AGGREGATES	CRUSHED ROCK	*BS 63:1951 Single-sized roadstone and chippings (*detailed specification for crushed rock/slag and grading*) [Db1]
	SLAG	The British Slag Federation
	GRAVEL	*BS 1984:1953 Single-sized gravel aggregates for roads [Db1]
	GRANITE	
	LIMESTONE	The Limestone Federation *BS 812:1960 (sampling and testing) [Db] Arch J, 18 February 1960, p 299 [(14)] BEAZLEY, p 37 [(14)]
FILLERS	(ie fine aggregates) Aggregate exposed on the surface should have an acceptable resistance to polishing under traffic. Except in rolled asphalt surfacings gravel aggregate is normally used only on the less heavily trafficked roads: granite and limestone are most commonly used: for light traffic, limestone is preferable as it is less susceptible to frost damage	RRL Road Note 5 [(14)] ***RRL Technical Paper 30 A study of single-sized gravel aggregates for roadmaking 1954 [Db1]
BINDERS	TAR (coal tar) By-product of coal gas distillation. Tar is cheaper than bitumen but not so durable when used in an open textured wearing course. It is obtainable in three grades:	*BS 76:1943 Tars for road purposes [Ds1] Arch J, 18 February 1960, p299 [(14)] BEAZLEY p 37 [(14)] Literature from British Road Tar Association 9, Harley Street, London W1
	RAPID SETTING—for base courses close textured carpets and surfaces dressings	*RRL Road Note 1, Recommendations for tar surface dressings (3rd edition) 1958 [(14)] *RRL Road Note 4 Design of concrete mixes (2nd edition) 1950 [Df] RRL Road Note 5 [(14)]
	MEDIUM SETTING—medium texture carpets	**RRL Technical Paper 31 The durability of road tar, 1954 [Ds1]
	SLOW SETTING—open texture carpets Tar is more susceptible to temperature change and harder to work when cooling and goes soft in hot weather. It is common for specification as a base course and bitumen for the wearing course	Literature from Federation of Coated Macadam Industries, 37 Chester Square, London SW1
	BITUMEN Bitumen occurs naturally in rock asphalt or as a by-product of petroleum distillation. It is more durable than tar-resurfacing after six or seven years as compared with four or five	No BS except those within Road Surfacing *BGWF publication INF/5 Dense bitumen macadam [Ds5]
	ASPHALT A natural or mechanical mixture of bitumen and finely ground mineral fillers	***RRL Technical Paper 36 The sampling and analysis of rolled asphalt and coated macadam 1956 [Ds5]

		COMPRESSED NATURAL ASPHALT	**BS 348:1948 [Ds5]
		MASTIC ASPHALT Unlikely to be used other than for very heavy traffic roads	*BS 1446:1948 Mastic asphalt for roads and footways [Ds4] *BS 1447:1948 Mastic asphalt (limestone aggregate) for roads and footways [Ds4]
		HOT ROLLED ASPHALT Laid as single or two course, or as wearing course on suitable coated macadam base course gives very durable surface, usually roughened by rolling in chippings: positive seal of formation from weather: long life	*BS 594:1958 Rolled asphalt, asphaltic bitumen and fluxed lake asphalt (hot process) [Ds5] Asphalt Roads Association, 14 Howick Place, Victoria Street, SW1 Arch J, 18 February 1960, p 299 [(14)]
		COLD ASPHALT A fine graded asphalt: can be laid cold by comparatively unskilled labour: less susceptible to bad weather during laying: can be stored: essentially a wearing course it is normally laid to a thickness of $\frac{1}{2}$ or $\frac{3}{4}$ inch: a fine sandpaper finish capable of being coarsened with use of chippings	*BS 1690:1950 Fine cold asphalt [Ds5] Cold Asphalt Association Arch J, 18 February 1960, p 299 [(14)]
		DENSE TAR SURFACING Hot process of coarse and fine aggregate filler and high viscosity tar, giving dense impervious surface for all types of traffic: one or two coat work: warm dry weather essential for laying; over-cooling of material after mixing must be avoided; costs more than coated macadam, therefore normally restricted to wearing course; least susceptible to oil drippings	*BS 802:1958 Tarmacadam with crushed rock or slag aggregate [Ds5] *BS 1241:1959 Tarmacadam and tar carpets (gravel aggregate) [Ds5] *BS 1242:1960 Tarmacadam tarpaving for footpaths, playgrounds and similar works [Ds5] *BS1621:1954 Bitumen macadam with crushed rock or slag aggregate [Ds5] *BS 2040:1953 Bitumen macadam with gravel aggregate [Ds5] British Road Tar Association Arch J. 18 February 1960, p 299 [(14)] *BGWF Publication INF/6 Dense Tar Surfacing 1960 [Ds5]
		COATED MACADAM Aggregate bound together with tar, bitumen or tar/bitumen mixtures	BS 802:1959 [Ds5] BS 1241:1959 [Ds5] BS 1242:1960 [Ds5] BS 1621:1954 [Ds5] BS 2040: 1953 [Ds5] Arch J. 18 February 1960, p.[299][(14)] FEDERATION OF COATED MACADAM INDUSTRIES BRITISH ROAD TAR ASSOCIATION BRITISH SLAG FEDERATION LIMESTONE FEDERATION
		GROUTED MACADAM	*BRITISH ROAD TAR ASSOCIATION: Dense tar surfacing (2nd edition revised) 1959 [Ds5] *For light traffic*, Arch J, 18 February 1960, p 300 [(14)] *BGWF publication INF/7 Precoated chippings for surface dressing 1959 [Db1]
		GRAVEL SEALED WITH COLD BITUMINOUS EMULSION	**BS 434:1960 Bitumen and road emulsion (anionic) [Ds1] BS 2542:1960 Recommendations for the use of bitumen emulsion (anionic) for roads [Ls2] BEAZLEY, p 40 [(14)] Colas instruction book [(14)]
		UNSEALED GRAVEL	DSIR sources of aggregate HMSO [(Db1)] BEAZLEY, p 42 [(14)]
		SURFACE DRESSING WITH HOT TAR SURFACE DRESSING WITH HOT BITUMEN	RRL, Road Note No 1 DSIR/HMSO [(14)]
19	**Consider and determine whether single course or two course surfacing**	Thickness or surface required (*up to 2½ inches in one course*)	BEAZLEY, p 35, 36 [(14)] RRL, Road Notes 20 and 29 [(14)]
		Surface texture Speed of laying surfacing Lasting quality of surfacing Evenness in base course	Arch J, 18 February 1960, p 297 [(14)]

	Expense of carpet Use of costly aggregates and/or binders to give adequate non-skid properties	*Table giving a guide to the choice of surfacing* *Gaps under a 10 ft straight edge on surface of base* / *thickness of surfacing* / *number of courses* *Over ½ inch* / *Up to 4 inches* / 2 *½ inch or under* / *Up to 2 inches* / 1 or 2 *Under ⅜ inch and where strength of base is adequate** / *Under 2 inches* / 1 (**the relationship between the minimum thickness of the surfacing and the maximum size of the aggregate must be as in relevant* BS) *If roadway is used for site access, base course can be laid early, protected with blinding, cleared off on completion, and wearing course applied*
20 **Rigid base pavements**	Assess the implications, including cost of rigid base pavements	Arch J, 4 February 1960, p212 [(14)] RRL Road Note 29 BEAZLEY, p 50 [(14)] Guide to Concrete Road Construction
	Classify traffic and subgrade conditions into categories described in Road Note 29 and Guide to Concrete Road Construction Determine design details and estimate cost Compare cost with that of alternative types of road, taking account of: Provision of access roads for construction traffic Maintenance costs	Concrete roads 1 Earthworks subgrades and bases 1955 2 Slab design 1959 2nd revised edition 3 Design of mixes 1955 4 Construction method 1955 The economy of concrete roads 1954 Concrete roads in estate development 1947 } CCA publications [(14)]
PREPARATION OF FORMATION	Compaction (Consider moisture content) Sealing with hot tar bitumen etc Tolerances on levels	MOT, Specification for Roads and Bridgeworks [(14)] Guide to Concrete Road Construction [(14)]
21 **Consider use**	If concrete finish required: TYPES/VARIATION OF SURFACE PATTERN POOR SOIL AVAILABILITY OF LOCAL MATERIALS PROVISION OF ACCESS FOR CONSTRUCTION TRAFFIC	
22 **Assess factors governing slab thickness**	CLASSIFY SOIL ASSESS TRAFFIC INTENSITY PREPARATION OF FORMATION	As previously for flexible pavements para 12 *RRL Road Note 19 The design thickness of concrete roads, 1955 [Ab5] *CCA publications Concrete roads 1 and 2 [(14)]
	SELECT SUB-BASE THICKNESS: type of soil intensity of traffic	Arch J, 4 February 1960, p 212, table I [(14)]
	CHOICE OF COVER TO SUB-BASE waterproof paper polythene sheet	BS 1521:1949 [Lj2]

	hot tar bitumen cold emulsion	
23 **Design base**	Thickness/reinforcement based on: Soil conditions/traffic intensity Type of material Method of compaction	Arch J, 4 February 1960, p 212, table 2 [(14)] BEAZLEY p 53 [(14)] *CCA publication, Specification for housing estate and other minor roads in concrete, Appendix B table [(14)] CCA publication Concrete roads 2 [(14)] AJ Information Sheet No 1013 Road construction: movement joints [**14**]
	Select reinforcement weight type position overlaps	*BS 1221:1945 Steel fabric for concrete reinforcement [Ed2] *BS 785:1938 Rolled steel bars and hard drawn steel wire for concrete reinforcement [Ed2] RRL, Road Note 29 MOT Specification for Roads and Bridgeworks Guide to Concrete Road Construction
	Select mix of concrete: strength workability durability	**BS 146:1958 Portland—blast furnace cement [Dq2] **BS 877:1939 Foamed blast furnace slag for concrete aggregate [Db3] *BS 882,1201:1954 Concrete aggregates from natural sources [Db1] BS 1047:1952 [Db3] RRL Road Note 4 [Df] **RRL Technical Paper 5 The grading of aggregates and workability of concrete. W. H. Glanville, A. R. Collins, D. D. Matthews (2nd edition) 1947 [Df]
	Design expansion joints *dowel bars* *width of filler* *type of filler* *sealing compound* *spacing* *layout at road junctions*	*RRL Road Note 7 Filling and sealing materials for joints in concrete roads R. S. Mullard (2nd edition) 1955 [Dt4] RRL, Road Note 29 [(14)] Guide to Concrete Road Construction [(14)] Concrete Roads: Design and Construction HMSO [(14)]
	Design contraction or dummy joints	**BS 2499 Tests to assess the properties of hot applied joint sealing compounds for concrete pavements [Db]
	Design construction joints Longitudinal joint *type* *tie-bars* *full width construction with sawn joints (special reinforcement with extra transverse steel)*	*CCA Concrete Roads, 4 Construction methods 1955 [(14)]
24 **Select finish**	Surfacing requirements noted above use of self-finishing possible with concrete TAMPED—½ in shallow ridge formed during tamping	*Specify riding quality (acceptable surface inequalities)* MOT, specification for Roads and Bridgeworks [(14)] *Glare free: non-skid: subject to abrasion and flaking: suitable for steep gradients: generally unattractive: colour can be used but only sparingly if crude appearance to be avoided* BEAZLEY, p 58-9 [(14)] Arch J, 18th February 1960, p 299 [(14)]
	SMOOTHING BOARD	*By following tamper with board sprung to road profile and resting between side forms: care must be taken not to over work surface*
	EXPOSED AGGREGATE	BEAZLEY, p 60-64 [(14)] Arch J, 18 February 1960, p 299 [(14)] *Exposure of aggregate can be achieved by variety of means: offers opportunities for variety and colour: skid resistant*

	CRIMPING ROLLER	*Use of roller with projecting steel cones giving indented texture* BEAZLEY, p 65-8 [(14)]
	LINEAR BOARD PATTERNS	*Linear pattern by edge board, V shaped or square, up to ¾ in deep: capable of development as a technique* BEAZLEY, p 65 [(14)]
	BRUSHED FINISH	Guide to Concrete Road Construction *Suitable for main roads because of its skid resistant properties*
25 **Assess likely sub-soil drainage problems**	(Applicable to both rigid and flexible bases) Note existing conditions: SUB-SOIL DRAINAGE highest anticipated water table SOIL CLASSIFICATION—chalk gravel silty clays heavy clays SOIL CONDITIONS—sodden ground large trees/shrubs	*Will require precautions against surface water run off: subject to frost heave* *Will require precautions against surface water run off* *Subject to frost heave* *Will require subsoil drains if any cuttings anticipated* *Pumping may be required during construction* *To be avoided if at all possible* *Alignment to be kept 15 ft clear if possible*
INITIAL LAYOUT 26 **Prepare an initial layout of the whole site**	Relative to: BUILDINGS LANDSCAPING LEVELS	
27 **Check initial layout**	With regard to: ALIGNMENT—roads paths EXTENT OF PAVED AREA LEVELS—gradients camber crossfalls balance of cut/fill LAYBYS BUS STOPS SUBSOIL DRAINAGE QUANTITY OF TOP SOIL (*surplus or deficient for banks*) LOCATION OF SERVICES surface water drains soil drains water main gas main electricity cable telephone cable other piped supplies steam/oil	CP 2003:1959, p 28-32 [C] **SfB(11) Ground: General**, paras 25 and 26
28 **Obtain a cost check against original allocation**		
29 **Discuss layout**	with: LOCAL PLANNING AUTHORITY LOCAL AUTHORITY SURVEYOR GAS BOARD ELECTRICITY BOARD WATER BOARD GPO TELEPHONES	
30 **Discuss with client and obtain authority to proceed**		

DESIGN DETAILS (working drawings)

31 Surface water drainage

Determine cross falls and long falls with regard to type of finish — BEAZLEY p 97, 98 [(14)] Arch J, 18 February 1960, p 297 [(14)]

CONCRETE — 1:60 *straight cross fall*, 1:100-150 *long fall*

BITUMINOUS OR TAR SURFACING — 1:48 *camber* 1:200 *long fall*; 1:40 *straight cross fall*; 1:60 *playgrounds*

GRAVEL — 1:30

PAVING SLABS — 1:72

PUBLIC PAVEMENTS — 1:48 *and* 1:32 (*check with local authority*)

Select type of channel with regard to:

TYPE—flat, dished — BEAZLEY, p 98 [(14)] **BS 340 Precast concrete kerbs, channels, edgings and quadrants, 1950 [(14)]

MATERIAL—in-situ concrete, pre-cast concrete — BS 340:1950 [(14)]

granite and whinstone — *BS 435:1931 Granite and whinstone kerbs, channels, quadrants and setts [(14)]

flat sandstone — *BS 706:1936 Sandstone kerbs, channels, quadrants and setts [(14)]

scoriae blocks, setts, cobbles, hot asphalt

Select type of gratings according to:

CAST IRON OR STEEL — BEAZLEY, p 100-104 [(14)]

HEAVY DUTY — *Main roads*

MEDIUM — *Private roads ie no heavy vehicles or fast traffic*

Type 'A' straight bar for gradients of less than 1:50

Type 'B' curved base for gradients greater than 1:50

KERB TYPE — *Covers and frames for setting into footpaths and verges*

LOCK TYPE — *Note as the range is very wide reference should be made to trade literature*

Select types of gullies and rainwater shoes according to: — BEAZLEY, p 105 [(14)] *BS 65:1957 Salt glazed ware pipes [Ig4]

TYPE—trapped, plain — *BS 539:1951 Dimensions of drain fittings, salt-glazed ware and glass (vitreous) enamelled salt-glazed fireclay [Ig4]

MATERIAL salt glazed ware, concrete — *BS 556:1953 Concrete cylindrical pipes and fittings including manholes, inspection chambers and street gullies [If2]

Determine spacing of gullies depending on: — *Consult local authority*

CATCHMENT AREA, GRADIENT OF PAVED SURFACE, ANTICIPATED OPTIMUM RAINFALL, VELOCITY OF WATER, SIZE OF PIPE, GRADIENT OF PIPE — *Generally on "flat" road at 75 ft intervals increasing to 100 ft or 120 ft on slopes. On hills it should be closer but generally one gulley will drain approximately 2000 sq ft on normal slopes* BEAZLEY, p 105, 106 [(14)]

Select manholes covers according to:

GRADING 'A' heavy duty solid or ventilating — BEAZLEY, p 106-109 [(14)] *BS 497:1952 Cast manhole covers, road gully gratings and frames for drainage purposes [(12)] AJ Information Sheets 33, p 1 *For use in carriageways*

'B' medium duty solid or ventilating — *For use in footpaths, verges, carriage drives, cycle tracks*

'C' light duty inspection cover — *For use in domestic premises where no wheeled traffic*

	MATERIALS cast iron steel	*Stronger and more expensive but wears faster*
32 **Road kerbs**	With regard to:	**RRL Technical paper 18, Concrete kerbs, causes and prevention of failure, 1950 [(14)]
	FUNCTIONS:	
	Resistance to lateral thrust of carriageway and prevention of haunch disintegration	BEAZLEY, p 88-97 [(14)] Arch J, 18 February 1960, p 297 [(14)]
	Assist drainage and preventing surface water percolation to subgrade	BRITISH CAST CONCRETE FEDERATION Information Sheet D.12.1 [(14)]
	Definition, support and protection of footways and verges	
	Definitions of carriageway (particularly at night)	
	DESIGN REQUIREMENTS: flat	
	upstand for flexible pavements	
	upstand for rigid pavements	
	stepped	
	MATERIALS: granite and whinstone	BS 435:1931 [(14)]
	sandstone	BS 706:1936 [(14)]
	precast concrete	BS 340:1950 [(14)]
	brick	
	concrete	BCCF Information Sheet D.12.1 [(14)]
	timber	
	metal	
33 **Pedestrian surfaces**	Determine foundations	Arch J, 18 February 1960, p 300 [(14)] BEAZLEY p 65, 6 [(14)]
STONE SLABS	Select type of stone:	*Steps and paving:*
	York stone Portland Purbeck portland Slate Bath stone	*Special care must be taken in selecting stone for steps, staircases, and flagging, particularly for external use, for this is almost the hardest test to which stone can be put. Stones that are admirable for walls may have to be used with some hesitation for these purposes. Granite is obviously excellent, but expensive. The polishing of the tread is inadvisable, as it makes it too slippery. The best surface is the single axed; the serrations thus formed provide a good grip, and take a long time to wear smooth. Delabole slate from Cornwall and Westmorland slate make good, but costly, steps and flags* *The soundest stone for steps in a general way is York stone. Brown York is the best in appearance. Blue York generally has better wearing qualities. Stone from the Shepley quarries near Huddersfield is generally considered one of the best. Stone from Rossendale district in Lancashire is very hard and durable; it varies in colour from grey to blue; the best rock is known as Lonkey. The fine-grained silicious sandstones, such as Forest of Dean and Stancliffe are also used for paving, both externally and internally* *What applies to the material of external steps applies to external paving. Just as in masonry there are dressed ashlar and rubble walling, so in paving of a more formal kind there are dressed and squared stones, and for less formal self-faced or riven random paving* *BEAZLEY, p 66 [(14)]
	Select method of laying:	*BEAZLEY, p 74 [(14)]
	on sand dry	
	on five mortar dots	*BEAZLEY p 74 [(14)]
PRE-CAST CONCRETE AND PRECAST STONE PAVING SLABS	Determine use:	*BEAZLEY, p 71 [(14)] *BS 368:1956 Precast concrete flags [Sf2] *BS 1217:1947 Cast Stone [Df]
	pedestrian	*BCCF Information sheet D.11.1 paving slabs [Sf2]

	very heavy pedestrian (2 inches)	*BCCF Information sheet D.10.1 paving flags [Sf2]
	occasional vehicular (2½ inches)	*BS 2028:1953 Precast concrete blocks [Ff2]
	Select method of manufacture:	
	hydraulically pressed	
	open mould	
	Determine finish (texture/colour)	
	brushed aggregate (¾ inch)	*Washing and brushing of surface fines exposing aggregate*
	scattered aggregate (¾ inch)	*Aggregate scattered on after casting and subsequently washed and brushed—more expensive*
	large aggregate	*Cobbled texture*
	mechanical textures	
	vibrated slab with: linear pattern of raised stripes	*Moulded flags with rubber mat patterns*
	inset rubber strips	
	colour—by pigment: *grey-green*	
	sand-grey	
	red	
	buff	
	standard grey	
	Determine pattern	*BCCF Information sheet D.11.1 for sizes [Sf2] *Note: A modular slab 1 ft 8 in by 3 ft 4 in is now being manufactured by Industrial Concrete Products Ltd, Slough, Bucks, which offers a very wide variety of alternative patterns*
	Determine method of laying	
CLAY BRICK PAVING	Ensure type of brick is:	*BEAZLEY p 77-82 [(14)] *BS 1301:1946 Clay engineering bricks [Fg2]
	resistant to: *frost*	
	sulphate attack	
	free from high magnesium or calcium sulphate content	
	hard, well burnt	
	Select from: *wire cut*	
	pressed	
	stock	
	engineering bricks manufactured as paviors (plain and patterned)	*ie patterned stable paviors*
	Determine pattern of laying	
	Determine method of laying	*BEAZLEY, p 82-4 [(14)]
GRANITE SETTS	Determine pattern of laying	*BS 435:1931 [(14)]
	Determine method of laying	*Generally offered second hand locally. Seldom used for traffic—more generally as lay-bys, or for partial surfacing, lines of demarcation*
COBBLE PAVING	Consider sources of supply:	*MAGUIRE, R., External pavings Architectural Review 1957, February-April [(14)]
	Beaches—*firm having rights over stretches*	
	Flint gravel rejects—*local gravel pits*	BEAZLEY, p 84-7 [(14)]
	Cement manufacturers—*Those using chalk as raw material*	*Advice from Cement Marketing Board*
	Wash mill flints—*Potteries*	
	Imported—*from Normandy*	
	Determine method of laying:	
	hand pressed into 2 inches of concrete	
	laid in sand or fine gravel and rammed	*Consider future maintenance, weeding and ultimate relaying to restore levels*
	bedded in dry concrete, watered after laying	
	for vehicles, as above but on concrete slab base	
34 **Pavement junctions with grass**	Edges without kerb or channel	BEAZLEY, p 93, 108-9 [(14)]
	Edges with channel	
	Between grass and wall	
	Slabs in grass	
	Mowing strip	

35 **Trees in paved surfaces**	Retention of ground level at base Uses of unsealed gravel Use of tree grids: *iron* *pre-cast concrete* Use of open joints in paving Distance from buildings and walls on: *shrinkable clays* *normal soils* *light soils*	BEAZLEY, p 109-16 [(14)]
36 **Banks/verges**	Balance of cut and fill Surplus or deficiency of top-soil Ease of maintenance Erosion of top soil Edging between path and verge	*CP 2003:1959 Earthwork [C]
37 **Steps and ramps**	Number of flights Going Lengths of flights Types of step: *solid, carved out* *detached* Integration with building design Drainage	BEAZLEY, p 217-225 [(14)] SMITHSON, A. and P. For students only Brickwork dimensions, riser and going tables. *Arch Design* 1960, 30 (2) (February) p 78 [(14)]
38 **Underground services**	Location preferably under verges or footways Ducts Separation of services Requirement of local authority: *Water board* *GPO* *Gas Board* *Electricity Board* Varying depths	
39 **Select surface signs**	CATS EYES PAINTS PLASTICS CONCRETE METAL STUDS	*Consider change in surface material, pattern colour or texture as a means of warning or direction* **BS 873:1959 The construction of road traffic signs and internally illuminated bollards [(78)] *BS 1573:1949 Road studs and plates (stainless steel) [(14)] *BS 2086:1954 White line road paint [(14)] **BS 3262 : 1960 Road marking materials [(14)]
40 **Select and site furniture**	LIGHTING BOLLARDS TELEPHONE BOXES POST BOXES BARRIERS ROAD TRAFFIC SIGNS PUBLIC UTILITIES REQUIREMENTS	
41 **Prepare large-scale detailed cross-sections showing**	Overall dimensions Finished levels related to datum Cross falls/cambers Sub-grade condition Formation levels Flexible pavements Sub-base construction Base Surfacing 'A' Base Course 'B' Wearing Course Rigid (concrete) pavements Sub-base Base-course finishes Surfaces other than for carriageways Kerbs Edgings	*Camber preferable for two lane roads Falls* 1:48 *for concrete and asphalt;* 1:40 *for open textured surfaces* **RRL Road Note 17 Protection of sub-grades and granular bases by surface dressings, 1953 [Ab5]

	Surface water channels Gullies/gratings Manhole covers Underground services Land drainage Junction with grass Surface signs Tree planting Banks/verges Steps/ramps	**SfB (12) Drainage: General,** paras 16 and 20 AJ Information Sheet No 1005, Manhole covers [**12**] *Including existing and new water tables* **SfB (24) Stairs and Ramps: General**
42 **Prepare detailed layout**	In the form of: PLANS LONGITUDINAL SECTIONS CROSS SECTIONS Showing: ALIGNMENT LEVELS WIDTHS OF CARRIAGEWAYS FOOTWAYS HIGHWAYS RADII CROSS FALLS CAMBERS GRADIENTS RAMPS (vehicle and pedestrian) STEPS BANKING LAND DRAINAGE ALL SERVICES underground overhead	

Specification

		YORKE, F.R.S. Specification, London, 1961, Arch. Press [Ba5] Specification clauses as recommended by the following organisations: Cement and Concrete Association British Slag Federation British Road Tar Association Asphalt Roads Association British Granite and Whinstone Federation Federation of Coated Macadam Industries Limestone Federation MINISTRY OF TRANSPORT Notes on the 2nd Edition of the Specification for Road and Bridge works and on the preparation of Bills of Quantities. Specification for the 2nd Edition. MOT, HMSO 1957 [(14)]
43 **Concrete carriageways**	Cement Aggregates Water Reinforcements Dowel bars Tie bars Expansion joint filler Joint sealing material Waterproof underlays Forms Batching plant Mixers Proportion Water content Mixing concrete	*BS 146:1958 [Dq2] *BS 873:1939 [Db3] *BS 882,1201:1954 [Db1] *BS 1047:1952 [Db3] *BS 1221:1945 [Ed2] *BS 785:1938 [Ed2] *BS 2499:1954 [Db] *BS 1521:1949 [Lj2] *BS 1926:1953 Methods of specifying ready-mixed concrete [Eq4]

	Coloured concrete	CCA Specification for staining concrete garden paths with ferrous sulphate 1936 [Du4]
	Longitudinal and cross-falls	
	Excavation for carriageway	
	Base for concrete carriageway	
	Form setting	
	Concrete carriageway	
	Fixing dowel bars	
	Fixing tie bars	
	Spreading concrete	
	Compacting concrete and finishing the surface	
	Expansion joints	
	Longitudinal joints	
	Curing	
	Frosty weather	
	Removal of forms	
	Opening road to traffic	
	Ironwork in carriageways	BS 497:1952 [(12)]
	Kerbs	BS 340:1950 [(14)]
	Kerbs; Granite and Whinstone	BS 435:1931 [(14)]
	Sandstone	BS 706:1936 [(14)]
44 **Flexible carriageways**	Crossfalls	
	Excavations	
	Sub-base	BS 812:1960 [Db]
	Base	
	Flexible surfacing	BS's 63:1951, 76:1943, 348:1948, 434:1960, 594:1958, 802:1958, 1241:1959, 1446:1948, 1621:1954, 1690:1950, 1984:1953, 2542:1960, 1447:1948 and 2040:1953 [(14)]
	Flexible surfacing on concrete base	
	Channels	BS 340:1950 [(14)]
	Kerbs	BS 435:1931 [(14)] BS 706:1936 [(14)]
45 **Footpaths**	Excavation for footpath	
	Foundation to footpath	
	Pre-cast coloured concrete paving	BS 368:1956 [Sf2]
	Pre-cast concrete or artificial stone paving	BS 1217:1945 [Sf2]
	York stone flag paving	BS 2028:1953 [Se]
	Asphalt or coated macadam paving	BS 1242:1960 [Ds5]
	Concrete bed under paving	
46 **Gravel drive**	Excavation for drive	
	Drive	
	Kerbs	
	Edging	
47 **Garden paths**	Excavation	
	Edging	
	Brick paved paths	BS 1301:1946 [Fg2]
	Concrete path with in-situ finish	
	Concrete path with pre-cast paving	
	Tar paving and gravel path	
	Cinder path	
48 **Running track**	Layout	E and OE, Planning pp 22, 23 [Bb]
	Excavations	
	Edging	
	Weed prevention	
	Drainage	
	Base course	
	Foundations	
	Surface	
	Laying	
	Field events, run-ups and jumping pits	
	Dimensions	
	Throwing circles	
	Steeplechases	
49 **Stabilisation of soil and other material**		RRL Road Note 15 [(14)] *CCA publication, Cement roads Andrews, W. P. [(14)]

Contract stage

50 **Consider factors likely to affect construction period**	SITE LIMITATIONS—access plant/equipment	
	PHASING OF OPERATIONS—base/surfacing section by section	
	TRAFFIC DIVERSIONS	
	PHASING OF SERVICES—surface water sewers water gas electricity GPO telephones	CP 2003:1959 [C]
	PROTECTION REQUIREMENTS—trees buildings overhead cables	
	CLIMATE—duration from anticipated starting date to completion	*Earth works should be carried out between March and October wherever possible*
	SITE FACTORS flooding marshy land high water table	
	AVAILABILITY OF LABOUR	
	PLANT AND EQUIPMENT	See Appendix B
51 **Determine method of selecting contractors**	PUBLIC ADVERTISEMENT SELECTED LIST NOMINATION	
52 **Determine form of contract**	WITHIN BUILDING CONTRACT SEPARATE CONTRACT FORM RIBA INST CE	
53 **Determine conditions of contract**	TIME FOR TENDERING TIME FOR APPROVALS DATE FOR POSSESSION CONSTRUCTION PERIOD SUBMISSION OF NOTICES MAINTENANCE PERIOD PHASING OF WORKS	
54 **Request successful contractor to prepare detailed programme**	Agree with contractor, suppliers, and sub-contractors PROGRAMME PHASING ORDERING PROVISION OF SAMPLES SITE STORAGE ACCESS TEMPORARY PROTECTION	
55 **Supervise construction**	Checking SOIL SAMPLE INFORMATION SUB-GRADE CONDITIONS SETTING OUT	*Recommendations of trade organisations noted earlier*
	TEST ON THE FOLLOWING MATERIALS: concrete	*CCA Advisory Note 1, Testing equipment for concrete site control, 1957 [Bb9]
	cement aggregate batching slump or compacting factor	CP 2003:1959, Section 6, Compaction earthworks [C] *BS 1881:1952, Methods of testing concrete [Db]. "Man on the job Leaflet" No. 4, CCA, The Slump Test [Bb2]
	FLEXIBLE PAVEMENTS	**BS 598:1958, Sampling and examation of bituminous mixtures for roads and buildings [Bb2] **RRL Road Note 10, A rapid method of analysis for bituminous road

		materials, A. R. Lee, C. M. Gough, E. H. Green, 1951 [Bb2] BS 812:1960 [Db]
	ROUTINE SUPERVISION CLEARANCE OF SITE ON COMPLETION	
56 **Carry out final inspection**	Prepare and hand over to client record drawings of the completed works showing data as built: Alignment Levels Dimensions widths radii All services	

Appendix A DEFINITIONS

Highway **Public Highway**	A way for the passage of foot, animal or vehicular traffic and over which such traffic may lawfully pass	*BS 892:1954, Glossary of highway engineering terms Clause 1001 [Aa1]
Road ROADWAY, DEPRECATED	A way for vehicles and for other types of traffic which may or may not be a highway as it may or may not be lawfully usable by all traffic	BS 892 Clause 1002
Street	A road within a town or other centre of habitation which has become partly or wholly defined by buildings established along one or both frontages and which may or may not be a highway	BS 892 Clause 1003
Private street	Generally, a street or road (whether or not comprising a public right of way) provided mainly to give access to adjoining premises, and not adopted by the local authority for purposes of repair	BS 892 Clause 1004
Accommodation road	A road used only for a limited purpose, such as to give access to private or public property	BS 892 Clause 1019
Service road	A subsidiary road between a principal road and buildings or properties facing thereon, and connected only at selected points with the principal road	BS 892 Clause 1020
Footpath **Fieldpath** PATHWAY, DEPRECATED	A way or means or passage for pedestrians only, generally across fields or open spaces, and not associated with a carriageway	BS 892 Clause 1023
Carriageway ROAD, DEPRECATED ROADWAY, DEPRECATED ROAD SURFACE, DEPRECATED	That portion of a highway intended primarily for vehicular traffic	BS 982 Clause 3401
Footway PAVEMENT, DEPRECATED	That portion of a road reserved exclusively for pedestrians	BS 892 Clause 3402
Formation	(*a*) The surface of the ground in its final shape after completion of the earthworks (*b*) A series of strata having some common characteristic; also any well-developed stratum or rock mass	BS 892 Clause 3409
Shoulder	A strip of highway, adjacent to and level with the main carriageway but generally of lighter construction, to provide an opportunity for vehicles to leave the carriageway in an emergency or to provide lateral support to the carriageway	BS 892 Clause 3412
Haunching	Work done in strengthening or improving the outer strip of the carriageway (see Definition No 3234)	BS 892 Clause 3414
Crown (of a carriageway)	The highest portion of a cambered carriageway in cross-section	BS 892 Clause 3415
Base	The layer in a road construction which provides the principal support to the surfacing	BS 892 Clause 3416
Sub-base	A layer of material sometimes provided between the formation and the base, for a special purpose, eg drainage or to add strength to the construction	BS 892 Clause 3417
Foundation	(*a*) Natural. The earth, rock or other material existing below the formation (*b*) Roads and Structural. That portion of the work constructed to distribute or transmit the weight of the pavement or structure, together with any superimposed load, to the material existing below the formation	BS 892 Clause 3418
Subgrade	The natural foundation or the fill which directly receives the loads from the pavement	BS 892 Clause 3419
Regulating course	A layer of variable thickness applied to the base or old road surface to adjust the shape preparatory to surfacing	BS 892 Clause 3421
Racking course	A compacted layer of graded stone spread over a pitched foundation to fill interstices and to bring it to correct profile before surfacing	BS 892 Clause 3422

Base-course (of the surfacing)	The layer or layers of surfacing other than the wearing course	BS 892	Clause 3423
Wearing course	The top layer of the surfacing which carries the traffic	BS 892	Clause 3424
Surface	The exposed face of the wearing course	BS 892	Clause 3425
Surface dressing	A wearing surface consisting of a layer of small aggregate, such as stones, chippings, slag or gravel, etc, superimposed upon a thin layer of road tar, bitumen, or the like, freshly applied to an existing road surface	BS 892	Clause 3427
Sealing coat	Bitumen, road tar or an emulsion of either applied as a thin film to a surface to close the voids with the object of rendering the surface waterproof	BS 892	Clause 3428
Blinding	The application of a loose layer of fine material to reduce surface voids	BS 892	Clause 3429
Gritting BLINDING, DEPRECATED	The operation of spreading upon the wearing surface or similar material, or the application of small aggregate in surface dressing	BS 892	Clause 3430
Kerb	A border of stone, concrete or other rigid material formed at the edge of a carriageway or other pavement	BS 892	Clause 3447
Earth road	A road where the traffic runs on the natural soil, suitably regulated and shaped, which has or has not been waterproofed by the addition of a stabilising material	BS 892	Clause 3501
Gravel road	A road constructed of gravel, with or without the addition of sand or clay	BS 892	Clause 3502
Pavement	(*a*) A general term for a paved surface. The superficial covering of an area such as a street, road or footpath, consisting either of blocks or units close together or of asphalt, coated macadam, concrete or the like (*b*) A term applied specifically to the whole construction in a road (including any layer strengthened or stabilised in situ by the addition of other material) made to support traffic above the subgrade	BS 892	Clause 3503
Flexible pavement	A form of road construction which, for the purpose of design, is assumed to have no tensile strength (eg bituminous surfacing on pitching)	BS 892	Clause 3504
Rigid pavement	A form of road construction in which, for the purpose of design, the tensile strength is taken into account (eg concrete)	BS 892	Clause 3505
Concrete road	A general term for a road in which the wearing course consists of concrete. It is usually implied that the concrete layer combines the functions of base and of surfacing	BS 892	Clause 3506
Paving	A wearing course laid upon a prepared foundation consisting of units fitted closely together or of a layer of asphalt, coated macadam, concrete or the like	BS 892	Clause 3507
Surfacing	The top layer or layers, comprising the wearing course and/or base course but not the base	BS 892	Clause 3513
Carpet thin surfacing	A wearing course containing a road tar or bitumen binder and having a compacted thickness not greater than 1½ in and laid normally as a single course direct on to an existing surface	BS 892	Clause 3514
Water-bound macadam	A form of road construction consisting of broken stone or gravel, compacted in the presence of water, the binding agent used being clay, mud, sand, stone particles, or the like	BS 892	Clause 3515
Cement-bound macadam	A form of road construction in which Portland cement is added to the aggregate during the process of laying	BS 892	Clause 3516
Grouted macadam	A form of road construction of coarse aggregate into the voids of which a liquid binder, which may be bituminous or Portland cement, sand and water, is poured after laying and partial compaction	BS 892	Clause 3517
Coated macadam	A road material consisting of coarsely graded mineral aggregate that has been coated with a specified binder, such as road tar, bitumen or the like by a controlled process, having a preponderance of coarse aggregate and a substantial proportion of voids	BS 892	Clause 3518
Bitumen macadam	A road material consisting of aggregate and bitumen, mixed under controlled conditions, having a preponderance of coarse aggregate and a substantial proportion of voids (BS 1621 and BS 2040)	BS 892	Clause 3519
Tarmacadam	A road material consisting of aggregate and road tar or tar-bitumen mixture, mixed under controlled conditions, having a preponderance of coarse aggregate and substantial proportion of voids (BS 802 and 1241)	BS 892	Clause 3520
Tar paving	A surfacing of tarmacadam laid in one or two courses for footpaths, playgrounds, and similar areas for pedestrian or very light vehicular traffic (BS 1242)	BS 892	Clause 3521
Dense tar surfacing	A wearing course substantially free from voids and consisting of a mixture of high viscosity road tar and aggregate in such gradings and proportions that, when hot, it can be	BS 892	Clause 3522

	spread by rakes or by a mechanical spreader and compacted by means of a roller	
Rolled asphalt	A wearing or other course substantially free from voids and consisting of a mixture of a relatively hard bitumen with aggregate in such gradings and proportions that, when hot, it can be spread by rakes or by a mechanical spreader and compacted by means of a roller (BS 594)	BS 892 Clause 3523
Asphaltic concrete	A term used largely in America, denoting an impervious rolled asphalt containing a substantial proportion of coarse aggregate	BS 892 Clause 3524
Compressed rock asphalt ROCK ASPHALT, DEPRECATED	A wearing course formed by compressing while hot a powder consisting essentially of natural rock asphalt (BS 597, 1446, and 1447).	BS 892 Clause 3525
Mastic asphalt surfacing	A wearing course formed by spreading hot mastic asphalt to the required form and contour by means of hand floats. (BS 597, 1446 and 1447).	BS 892 Clause 3526
Clinker asphalt	A wearing course consisting of rolled asphalt in which the principal aggregate is clinker: unless otherwise stated, it is implied that the clinker is derived from the calcination of domestic refuse	BS 892 Clause 3527
Fine cold asphalt	A wearing course consisting of bitumen and aggregate under ¼ in in size, the characteristics of both being such that the mixture can be spread and compacted while cold or warm (BS 1960)	BS 892 Clause 3528
Surface dressing	A wearing surface consisting of a layer of small aggregate, such as stones, chippings, slag or gravel, etc, superimposed upon a thin layer of road tar, bitumen or the like, freshly applied to a road surface (see Definition No 3427)	BS 892 Clause 3529

Appendix B. PLANT

Types

Air compressors
Angledozers and bulldozers
Asphalt and black top spreaders and pavior finishers
Asphalt and tarmacadam plant
Barrow, hand and mechanically propelled
Batching and mixing plant for concrete
Block-making machines
Buckets and skips
Concrete and mortar mixers
Concrete pumps
Concrete spreaders and pavior finishers
Conveyors, elevators, loaders and feeders
Cranes, crawler, truck and rail mounted
Crushers, stone breakers, granulators, rolls, hammer, ball and rod mills
Dewatering equipment—wellpoint
Driers—stone and sand
Drills and bits—rock, quarry, water and blast hole
Drill sharpeners and bit grinding machines
Dumpers and dump wagons, end and bottom
Dump
Excavators, draglines, shovels, skimmers and trenchers
Excavators—multi-bucket
Grabs and dredgers
Graders, motorised and towed
Gravel pumps
Gritters
Hoists and winches
Hydraulic back hoes and swing shovels
Loading shovels
Locomotives, diesel
Pile driving and extracting plant, and
Pile driving hammers
Pneumatic tools and plant
Power control units for earth-moving equipment
Power-operated rotary trowels
Pumps—centrifugal, diaphragm and rotary axial flow
Rammers, rippers and road breakers
Road forms
Road heaters and planers

General references (ungraded)

The Federation of Manufacturers of Construction Equipment. British construction equipment, building, quarrying, civil engineering
YORKE, F.R.S. Specification, London, 1961, *Arch. Press* [Ba5]
AJ November 26 1959, p 589, for soil stabilisation equipment [Bb7]
CP 2003:1959 Section 7.05 [C]
BRS Digest 113 The costs of mechanical plant 1958 [Bb7]
RRL Technical Paper 27 Survey of some mixing plants for asphalt and coated macadam D.B. Waters 1953 [Bb6.L]
BS 327, Part 1: 1951 Derrick cranes [Bb4]
BS 327, Part 2: 1954 Derrick cranes (hand operated) [Bb4]
BS 466:1960 Electric overhead travelling cranes for general use in factories, workshops and warehouses [Bb4]
BS 536:1934 Light flat bottom railway rails and fishplates, 14 and 20 lb per yard and portable railway track 24 inch gauge. Types 1, 2 and 3 [Bb4]
BS 673:1950 Pneumatic tools and accessories [Bb5]
BS 1139:1951 Metal scaffolding [Bb4]
BS 1305:1959 Batch type concrete mixers [Bb6.E]
BS 1377:1948 [Ca3]
BS 1421:1947 Picks, beater picks and mattocks [Bb8.C]
BS 1757:1951 Power-driven mobile cranes [Bb4]
BS 1761:1951 Single bucket excavators [Bb7]
BS 1786:1951 Steel wheelbarrows [Bb4]
BS 1857:1952 Pipe cutters [Bb8.I]
BS 1924:1957 [Ca3]
BS 2452:1954 High pedestal or portal jib cranes [Bb4]
BS 2482:1954 Timber scaffold boards [Bb4]
BS 2596:1955 Components of crawler tractors and earth moving equipment [Bb4]
BS 2830:1957 Suspended safety chairs [Bb9]
BS 3125:1959 Power-driven mast hoists for materials [Bb4]
BS 3143:1959 Road danger lamps [Bb9]
BS 1622:1960 Winter gritters for roads [Bb7]

Road sweepers
Rollers—road, dead weight
Rollers—vibratory and compaction
Sand dewaterers and classifiers
Saws—chain and circular
Scrapers—motorised and towed
Screens—all types
Shunting tractors
Soil stabilisation equipment
Steel piling
Steel shuttering
Storage bins and silos
Tar and bitumen boilers, sprayers, distributors
Transporters and pumps
Tractor—track-laying and wheel
Transporters—single rail
Trench-cutting machines and trenching equipment
Truck dischargers
Truck mixers and agitators
Vibrating equipment for concrete
Wagons—railway, light tipping platform and general
Washing and screening plant for aggregates
Weighers for concrete aggregates and cement

BS 1623:1950 Hand-rollers for road and constructional engineering [Bb7]
BS 1676:1960 Heaters for tar and bitumen (mobile and transportable) [Bb9]
BS 1707:1959 Hot binder distributors for road surface dressing [Bb7]
BS 3137:1959 Method for determining bursting strength of paper [Db]

Appendix C. TRADE ORGANISATIONS

ASPHALT ROADS ASSOCIATION,
53 Victoria Street, London SW1

BRITISH CAST CONCRETE FEDERATION,
105 Uxbridge Road,
Ealing, London W5

BRITISH GRANITE AND WHINSTONE FEDERATION,
55 Pall Mall, London SW1

BRITISH READY MIXED CONCRETE ASSOCN,
19 The Crescent,
Ilford, Essex

BRITISH ROAD TAR ASSOCIATION,
9 Harley Street, London W1

BRITISH ROAD FEDERATION LTD,
26 Manchester Square, London W1

BRITISH SLAG FEDERATION,
1 Catherine Place, London
SW1

BRITISH TARPAVIORS FEDERATION,
47 Victoria Street, London
SW1

CEMENT MAKERS FEDERATION,
Terminal House,
52 Grosvenor Gardens, London SW1

CEMENT AND CONCRETE ASSOCIATION,
52 Grosvenor Gardens, London
SW1

CONTRACTORS PLANT ASSOCIATION,
73 High Holborn, London
WC1

FEDERATION OF CIVIL ENGINEERING CONTRACTORS,
Romney House,
Tufton Street, London SW1

FEDERATION OF COATED MACADAM INDUSTRIES,
37 Chester Square, London
SW1

FEDERATION OF MANUFACTURERS OF CONSTRUCTION EQUIPMENT,
121 Queen Victoria Street, London EC4

LIMESTONE FEDERATION,
Manfield House,
Strand, London WC2

NORTH WALES SLATE QUARRIES ASSOC,
c/o Messrs Templar,
267 High Street, Bangor

REINFORCED CONCRETE ASSOCIATION,
94 Petty France, London SW1

ROAD EMULSION ASSOCIATION,
47 Victoria Street, London SW1

SAND & GRAVEL ASSOCIATION OF GREAT BRITAIN,
National Office,
48 Park Street, London W1

NATIONAL FEDERATION OF CLAY INDUSTRIES,
Drayton House,
Gordon Street, London WC1

NATURAL ASPHALT MINE-OWNERS & MANUFACTURERS COUNCIL,
94/98 Petty France, London SW1

BITUMINOUS ROADS DEVELOPMENT GROUP,
76-86 Strand, London
WC2

CAST STONE AND CONCRETE FEDERATION,
Victory House,
Leicester Square, London WC2

ENGLISH SLATE QUARRIES ASSOCIATION,
1 Bristol House,
Southampton Row, London WC1

NATIONAL COUNCIL OF BUILDING MATERIAL PROCESSES,
10 Storey's Gate, London
SW1

COLD ASPHALT ASSOCIATION,
47 Victoria Street, London
SW1

Note: The names of organisations can be found in The Ministry of Labour Dictionary of Employers Associations, Trade Unions Joint Organisations, etc 1960 HMSO £1 1s

AJ SfB (14)

Technical study UDC 625·8 Roads and pavings : General

The structural design of roads

This technical study by Ralph Iredale gives the structural considerations involved in the design of flexible and rigid pavements

Construction

The constructional purposes of a road are:
(*a*) to spread the loads applied by traffic so that stresses set up in the subgrade do not cause excessive deformation of the soil.
(*b*) To protect the subgrade from climatic effects.
(*c*) To provide a durable, satisfactory riding surface.
Its effectiveness will depend upon the relative rigidities of the pavement and subgrade. Pavements can be of two types:
(A) Flexible, which have a comparatively low flexural rigidity, and where the base relies for stability on the interlocking of its constituent particles such as crushed rock, gravel, pitching and hardcore, and
(B) Rigid, which distribute the loads by concrete slab construction.
The final choice of construction methods will largely be determined by the local materials and plant available, and it is in this respect that the advice of the local surveyor should be particularly helpful. For major road works it is most likely that he will carry out the construction, and may in any case be ultimately responsible for maintenance if it is taken over by the local authority.
The principal factors which determine the design of a satisfactory pavement are:
(i) The quality of the subgrade
(ii) The type of construction
(iii) The applied loads and traffic conditions
(iv) Efficient subsoil and surface water drainage
(v) The quality of workmanship
The most widely used method of determining the thickness of a flexible pavement is the Californian Bearing Ratio Method (CBR Method) which is one of many empirical methods available. The application of the method and test procedure is described in Road Research Road Note 29 (a guide to the structural design of flexible and rigid pavements for main roads) HMSO 1960.

Subgrade

The quality of the subgrade, and its resistance to deformation, depends not only on soil types but on its moisture content and state of compaction; the strength generally decreasing with increasing moisture content, and its bearing capacity increasing with increasing density. For any soil and any given compacting effort there is an optimum moisture content. An increase in compaction will increase maximum density, but this will be achieved at a lower optimum moisture content. BS 1377: Methods of testing soils for civil engineering purposes describes laboratory compaction tests and methods for checking the state of compaction achieved in the field. Since laboratory compaction tests cannot be correlated with the performance of plant it may be desirable to carry out site tests to determine the most appropriate equipment for the particular soil. The performance of a wide variety of compaction plant on a range of soils is discussed in Road Research Laboratory Technical Papers 17, 33 and 45.

Table A Normal uses of surfacing materials

X Indicates normal practice but does not necessarily indicate that other materials cannot be used, or that all materials give similar service

	Mixed surfacing materials					Surfacings prepared in situ	
	Hot process			Warm or cold-laid materials			
	Rolled asphalt	Mastic asphalt	Compressed natural rock asphalt	Fine cold asphalt	Tar-macadam and bitumen macadam	Grouted surfacing	Water-bound gravel crushed stone
Main city streets	X	X	X	X	—	—	—
Residential city and urban streets	X	—	—	X	X	—	—
Roads carrying over 4,000 tons/day of traffic	X	—	—	X	X	—	—
Roads carrying less than 4,000 tons/day but more than 100 tons/day	X	—	—	X	X	X	—
Roads carrying less than 100 tons/day of traffic	—	—	—	X	X	X	X
City footways	X	X	—	X	X	—	—
Normal footways	X	—	—	X	X	—	—
Car parks	X	—	—	X	X	—	X
Factory yards	X	X	—	X	X	—	X
Markets	X	X	X	X	—	—	—
Playgrounds and cycle tracks	X	—	—	X	X	—	—
Runways and taxi-ways for aircraft*	X	—	—	—	X	—	—
Aircraft hard standings and aprons*	X	—	—	—	—	—	—
Type of base							
Soil	—	—	—	—	—	X	X
Stabilised soil	—	—	—	X require bituminous base course	S or T	—	—
Hardcore (brick or large broken stone, well blinded)	T	—	—		T	X	X
Stone pitching	T	—	—		T	X	X
Stone macadam (dry or wet) and water-bound gravel	S or T	—	—		S or T	X	X
Cement concrete	S or T	X	X	X	T or W	—	—
Bituminous bases including old bituminous surfacings	S, T or W	X	X	X	S, T or W	—	—
Sett paving	T	—	—	X	T	—	—

* Hard standings and take-off areas (warming-up areas) subject to jet blast and fuel spillage require special surfacing, eg dense tar surfacing.
S Single course (over 1½ in in compacted thickness).
T Two courses.
W Wearing course.

The strength and density of the subgrade can be affected after the construction is complete by the entry of water, climatic effects, vegetation, settlement and traffic. Water can enter through the pavement, by seepage of surface water from the verges or as a result of an increase in the height of a water table. It is important, therefore, that both surface and subsoil drainage aspects are carefully considered as early as possible. Serious drought conditions, particularly in clay soils can cause surface cracking, against which, unfortunately, there would appear as yet to be no satisfactory preventive measures. Generally cracks can be carefully sealed, but in exceptional cases reconstruction would be necessary. Freezing may cause frost heave, particularly in silty soils, fine sands and chalk. The reduction in the strength of the subgrade caused by excessive moisture during a thaw is likely to cause failure of the surface under traffic particularly with bituminous roads. Trees or shrubs planted too close to paved areas, particularly on clay soils, can cause drying out of the soil with effects similar to those caused by drought.

A pavement should be constructed as far above a water table as is economically practicable, a satisfactory dimension being about 4 ft. A water table can be lowered by drainage, or alternatively, the pavement raised on a low embankment.

During the construction of the foundation, protection from rain and surface water could be afforded by surface dressing as recommended in Road Research Note No 17: Protection of Subgrades and granular Bases by Surface Dressing (HMSO 1953).

Bases and sub-bases

For rigid (concrete) pavements, the concrete slab is the principal structural component, and the base is provided to:

Table B Main characteristics of surfacing materials

	Pre-mixed surfacing materials					Surfacing prepared in situ	
	Hot process		Warm and cold laid materials				
	Rolled asphalt	Mastic asphalt	Compressed natural rock asphalt	Fine cold asphalt	Tarmacadam and bitumen macadam	Grouted macadam	Water-bound surfacings
Permeability Texture	Impermeable Close	Impermeable Close	Impermeable Close	Permeable* Medium/Close	Permeable Open/Medium/Close	Permeable	Permeable
Surface finish	Coated chippings optional but not normally used on single course mixtures containing more than 45 per cent stone	Application of coated chippings sanding or indenting. Coated chippings are normally used for roads	Application of coated chippings normally used for roads	Application of coated chippings optional	None	Initial surface dressing followed by further surface-dressing during the next surface dressing season	
Average life as a running surface	The longest life as a wearing surface without subsequent treatment is generally considered to be obtained with mastic asphalt, compressed natural rock asphalt and hot rolled asphalt. The most economic selection is dependent upon local circumstances. Other surfacings do not usually give so long a life as a wearing course, but their service can be extended by periodic surface treatment						
Method of laying	Machine or hand spread	Hand floated	Spread and punned by hand	Machine or hand spread	Machine or hand spread	Binder should be applied by machine	Machine or hand spread
Interval between mixing and laying†	1½ to 2 hours	Reheated on site	12 hours	Some months if suitably fluxed	Normally up to 24 hours dependent upon proportion of flux in mixture can be increased to some days by special fluxing	—	—

* Becomes impermeable when fully compacted by traffic.
† In the case of hot process materials the important factor is the temperature of the material when laid. The times quoted may vary widely and will depend on the measures taken to prevent loss of heat during transit.

(*a*) form a working surface, on clays and silts, facilitating accurate control of slab thickness
(*b*) enable work to proceed during wet weather without damage to the subgrade
(*c*) prevent mud-pumping on clays and silts, and
(*d*) insulate frost-susceptible soils

For flexible pavements, the base and sub-base have similar functions so far as the transmission of traffic loads to the sub-grade is concerned, but because the base is subject to a higher intensity of stress than the sub-base, it must be constructed of higher grade materials.

With granular materials, bases and sub-bases should be thoroughly compacted during construction so as to minimise further compaction under traffic, which would cause uneven settlement of the surface. This can best be achieved if each layer thickness is 4 in to 6 in when compacted. Temporary surfacing is required if traffic is to be allowed to run on the base before the final surface is applied.

Alternative methods of constructing bases and sub-bases are discussed in the Ministry of Transport Specification for Road and Bridgeworks, 1957 (HMSO) and in CP2006:1960, pp 49-59.

Flexible pavements: surfacings

These include tarmacadam with crushed rock or slag aggregate and with gravel aggregate, bitumen macadam with similar aggregates, rolled asphalt (hot process), mastic asphalt with natural rock and limestone aggregates, compressed natural rock asphalt and fine cold asphalt. These are all covered by British Standards and by CP2006:1960.

In addition there are the following:—

(*a*) dense tar surfacing, which is a form still being developed, covered neither by a British Standard nor by a Code of Practice, but for which comprehensive information can be obtained from the British Road Tar Association.

(*b*) bituminous mixtures: wet process, and

(*c*) cement and grouted macadam, neither of which was considered as being at a sufficiently advanced stage for inclusion in the Code of Practice.

The following tables, abstracted from CP2006:1960, pp 106 and 107, indicate materials suitable for varying conditions: the Code of Practice should be referred to for all points of detail regarding construction. In particular there is a most useful check list on pp 168 and 169 as a guide to the possible faults that may occur when a mechanical finisher is used.

Cost will determine the final choice and this in turn will be influenced by the availability of suitable local aggregates, plant and labour related to the size of the project. Again local advice should be invaluable.

Rigid (concrete) pavements

There are three factors affecting the design and construction of concrete pavings to which particular regard should be paid, if uneconomic designs are to be avoided. They are:—

1. The relationship between the slab and the soil.
2. Methods of control to reduce variability of the concrete.
3. The use of machines.

CP2006:1960 deals very comprehensively with subgrade conditions, and the use of machines instead of manual methods of placing has made possible more effective control of the variability of the concrete. Manual methods are in fact superseded except for the smallest jobs.

The component materials for concrete are all covered by British Standards, and the mix should be sufficiently workable to allow for thorough compaction; have adequate compressive and flexural strength (a minimum compressive strength of 4,000 lb/sq in at 28 days by cubic test is normally specified); be dense to resist frost damage and the abrasive and impact action of traffic; finished with an even surface to give a good riding quality; and textured to minimise possibilities of skidding. Compaction without segregation is of utmost importance for strength, as 5 per cent of voids can reduce it by about 30 per cent and 10 per cent voids by 60 per cent. Vibrating or other machines compacting from the top surface are normally adequate for layers up to 12 in thick.

The principal cause of damage is frost, and the use of calcium chloride or salt for snow or ice removal in winter aggravates this. This can be avoided by ensuring that the water-cement ratio does not exceed 0·55 by weight. When concrete is laid in winter it should be protected from frost for the first few days. If it can be maintained at a temperature of at least 60 deg F for three or four days or at a temperature of at least 40 deg F for six or seven days it can usually be considered safe. When there is a possibility of salt being used for the removal of snow or ice within three months of laying the concrete, it is recommended that air-entrained concrete be used.

The design of mixes is fully dealt with in Appendix "A," CP2006:1960, Road Research Note No 4, 2nd Edition and in "Design of Mixes" Concrete Roads 3, published by the Cement and Concrete Association.

Design of Slabs:

Methods of design have been developed from practical data from actual roads rather than from theory.

Lengths will depend on spacing of joints which is discussed later, and widths should be limited to 15 ft for slabs less than 12 in thick. This dimension is directly related to the majority of machinery available.

Experience has shown that thickness is related to the intensity of traffic and the following table is based on the flow of commercial vehicles (ie all public service and commercial vehicles having unladen weight of more than 30 cwt) in both directions along a road. These figures for main roads can usually be obtained from the Ministry of Transport.

Table showing slab thicknesses and minimum weights of reinforcement related to Traffic Intensities:

Note: In Table C normal subgrades means all, with the following exceptions:

1. Very stable subgrades: well compacted and undisturbed foundation of old roads and well-graded gravel compacted to an air-void content of 5 per cent or less and having a CBR of not less than 100 per cent at the highest moisture content likely to occur.

(*a*) Slab thickness may be decreased by 1 in.

Table C Showing slab thicknesses and minimum weights of reinforcement related to traffic intensities.

	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)	(*f*)
Expected intensity of traffic: commercial vehicles/day	Very heavy 4,500-3,000	Heavy 3,000-1,500	Medium heavy 1,500-450	Medium 450-150	Light 150-45	Very light 45
Thickness of reinforced concrete slab (in) for normal subgrades	10	9	8	7	6	5
Thickness of base for normal subgrades	3 in for all traffic intensities except on gravel, sand or gravel-sand-clay subgrades which can be thoroughly compacted and where no base is needed					
Minimum weight of reinforcement fabric in lb/sq yd for roads with expansion and dummy contraction joints	6½ or 8½	5½ or 7½	5½ or 7½	4½	4½	3½

(*b*) No base is needed except where a levelling course is required.

2. Subgrades very susceptible to non-uniform movement:—organic or highly plastic clay having a CBR of 2 per cent or less, and where there are pockets of peat within a depth of 15 ft.

(*a*) Slab thickness should be increased by 1 in.

(*b*) A base of up to 6 in thick may be required.

3. Embankments more than 4 ft high:

(*a*) Slab thickness should be increased by 1 in.

(*b*) No base if embankment consists of gravel, sand or gravel-sand-clay which can be thoroughly compacted. On other materials a 3 in base is required.

4. Subgrades where the water table may rise to within 2 ft of the formation.

(*a*) Slab thickness should be increased by 1 in.

(*b*) No base on gravel sand, or gravel-sand-clay which can be thoroughly compacted. 6 in required for subgrades as in 2 above. 3 in for other subgrades.

5. Chalk and soils susceptible to frost heave:

(*a*) Slab thickness as Table C or as in 1 and 2 above as appropriate

(*b*) (i) Where no unreasonable inconvenience or danger to traffic permitted (ie more than 150 commercial vehicles per day) a granular base should be used to make up a total thickness of slab plus base to 14 in.

(ii) Where some occasional inconvenience to traffic is acceptable for economic reasons, no base is needed on chalk. On other soils it should be 3 to 6 in as appropriate—see Table C and 2 above.

6. Unreinforced concrete.

For traffic intensities of fewer than 150 commercial vehicles per day, an unreinforced slab may be used provided its thickness is 2 in greater than that recommended for reinforced concrete.

Reinforcement is intended to prevent cracks in the slab opening up, and to enable expansion joints to be more widely spaced. The Table sets out the amount of reinforcement required for varying traffic intensities. Reinforcement should be oblong mesh fabric to comply with BS 1221. It should be placed in the top of the slab with about 2½ in cover, and mats should be used in preference to rolls. Where alternative weights are given in the Table the

Table D Recommendations for spacing of expansion and contraction joints

Thickness of slab not less than (in)	Weight of reinforcement fabric not less than (lb/sq yd)	Maximum spacing of expansion joints (ft)	Maximum spacing of contraction joints (ft)	Width of expansion joints (in)
(*a*) Reinforced concrete slabs with expansion joints and dummy contraction joints				
10	6½	240 (180)	60	1
10	8½	240 (160)	80	1
8	5½	240 (180)	60	1
8	7½	240 (160)	80	1
6	4½	160 (120)	40	1
4	3½	120 (80)	40	1
(*b*) Unreinforced concrete slab				
8	—	120 (90)	15	1
6	—	90 (60)	15	1

Note: Figures in brackets are to be used in cold weather. If concrete has a water-cement ratio below 0·55 it is unlikely to be damaged by frost once it has reached a crushing strength of 2,000 lb/sq in (see C & CA Guide to Concrete Road Construction: Questions and Answers, p 54, for methods of protection).

heavier should be used only where 500 or more loads per year of 30 tons or over are expected.

Joints are introduced to provide for expansion and to control cracking. The spacing depends upon a number of factors relating to thermal expansion, temperature, friction between slab and subgrades, thickness of slab, and whether it is reinforced. Table D, on previous page, gives recommendations for spacing determined by the need to provide adequate space for the expansion of the concrete and by the need to relate the length of bay to the amount of reinforcement.

The joint gap is usually filled with a compressible and non-extruding material, placed from the bottom of the slab to within $\frac{3}{4}$ in or 1 in of the top surface. Materials used include fibre-board, knot-free softwood, cellular rubber and cork. Hot poured bituminous fillings are unsatisfactory as they are not elastic and extrude under pressure.

Dowel Bars are inserted to transfer loadings across the joint, and these are usually ms rods of $\frac{3}{4}$ in diameter (for 6 and 7 in slabs), 1 in diameter (for 8 and 9 in slabs) and $1\frac{1}{2}$ in diameter (for 10 and 11 in slabs). They should be 2 to 3 ft long, spaced at 12 in centres. Half the length should be coated with a thin film of bitumen or bituminous paint to prevent adhesion, a free moving cap placed on the coated end, and a gap, equal to the width of the expansion joint preserved between the end of the bar and the cap during construction.

Dummy contraction or intermediate joints are included to localise cracking, and are vertical grooves about one-third depth of the slab. Where they are widely spaced they should have dowel bars as for expansion joints and the reinforcement should not be continuous. They can either be formed during laying, or by sawing after the concrete has hardened thus avoiding interference with the progress of construction. Sawing would be expensive with flint gravel aggregates, when plates can be vibrated into the slab and the following machine passed over it.

Longitudinal joints can be constructed as for dummy joints.

Joints should be sealed to prevent ingress of water and grit. For longitudinal joints and transverse joints not more than 40 ft apart a hot-poured material to BS 2499:1954 may be used. For more widely spaced joints a softer rubber-bitumen or one of the recently developed synthetic materials may be needed. For further information on concrete pavements see Guide to Concrete Road Construction issued by the Cement and Concrete Association.

The diversity of materials and trades involved in road construction and the influence of local conditions is reflected in the number of contractors and trade organisations that are available to give advice. A list of trade organisations is given in Appendix C of the Element Design Guide; the principal source of advice, however, is the Road Research Laboratory, Harmondsworth, West Drayton, Middlesex.

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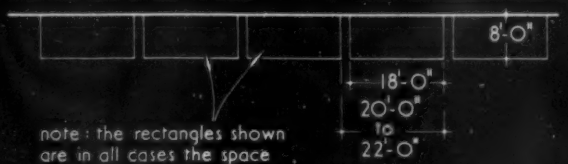
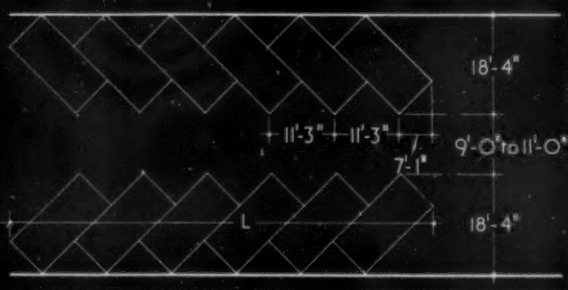
AJ **SfB (14)**

Information Sheet No. 1010 **UDC 625.8: 7117**
Roads and Pavings: General

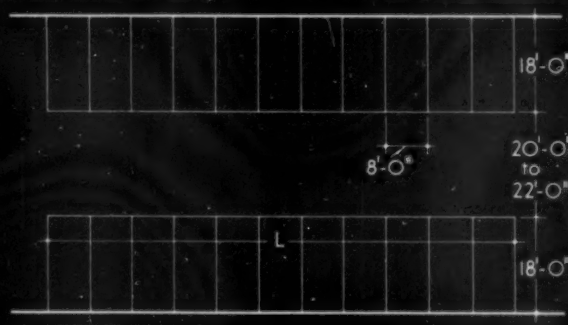


note : the rectangles shown are in all cases the space allotted to a car and do not represent the cars themselves

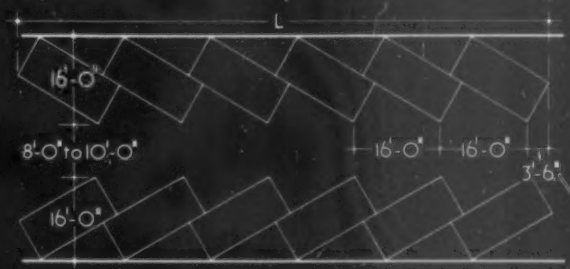
parallel parking



45° parking



90° parking



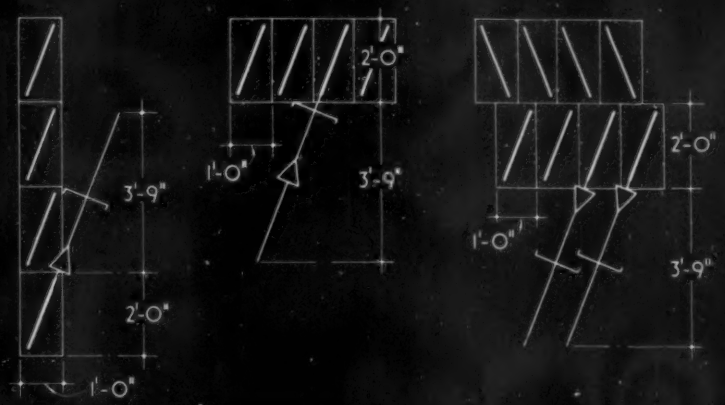
30° parking

60° parking

parking angle	no. of spaces(N)	approx. no per 100ft.	L	assumed clear distance between cars across aisle
30°	$\frac{L-3'-6"}{16'-0"}$	6	16'-0" N + 3'-6"	15'-0"
45°	$\frac{L-7'-1"}{11'-3"}$	8	11'-3" N + 7'-1"	16'-0"
60°	$\frac{L-6'-7"}{9'-3"}$	10	9'-3" N + 6'-7"	23'-0"
90°	$\frac{L}{8'-0"}$	12·5	8'-0"N	—

this table enables total length (L) to be determined for any of the above alternative parking arrangements where the number of spaces (N) is known

CARS : RECOMMENDED MINIMUM DIMENSIONS FOR ALTERNATIVE LAYOUTS



Stelcon system [Stelcon (Industrial Floors) Ltd.]

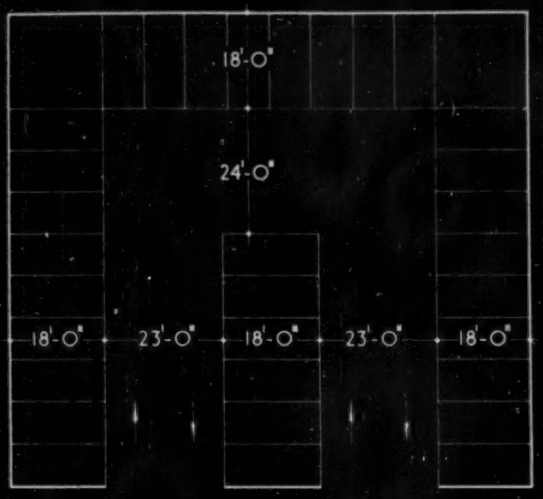
L-degrees	C	X	P
25	2'-9"	5'-3"	2'-7½"
45	2'-0"	4'-9"	4'-9"
90	2'-1"	—	6'-3"

VelopA system (Le Bas Tube Co Ltd.)

CYCLES : RECOMMENDED MINIMUM DIMENSIONS FOR ALTERNATIVE LAYOUTS

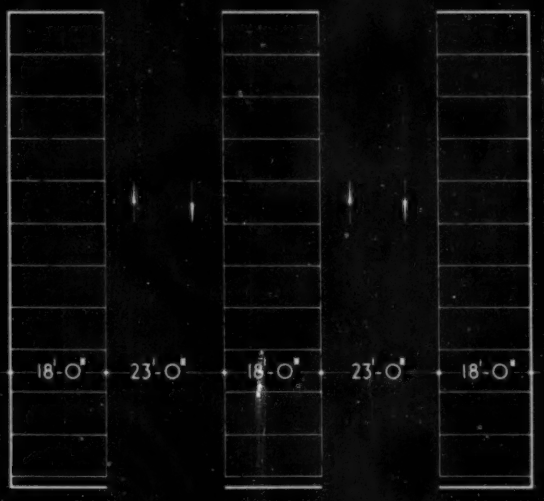
PARKING ARRANGEMENTS : CARS AND CYCLES

32 (number of cars which can be accommodated)



32

32



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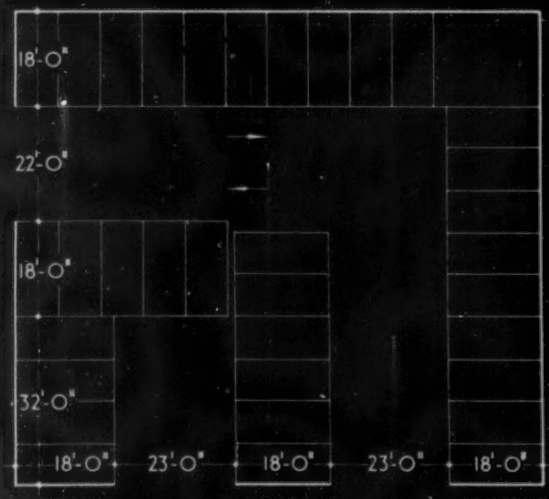

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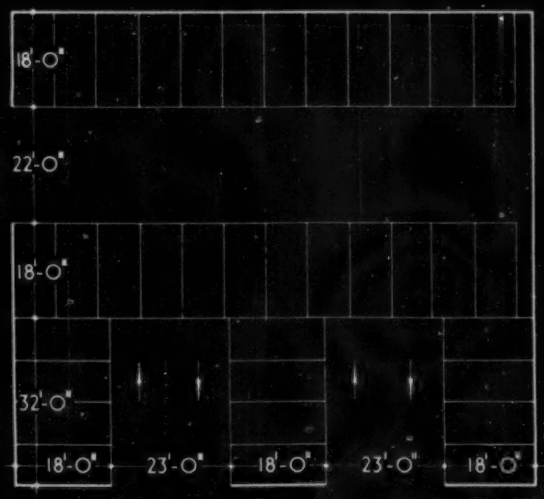

36

ALTERNATIVE LAYOUTS IN A SPACE 90'-O" x 100'-O". (based on 'Design and Detail of the Space between Buildings' by Elisabeth Beazley)

PARKING ARRANGEMENTS : CARS.

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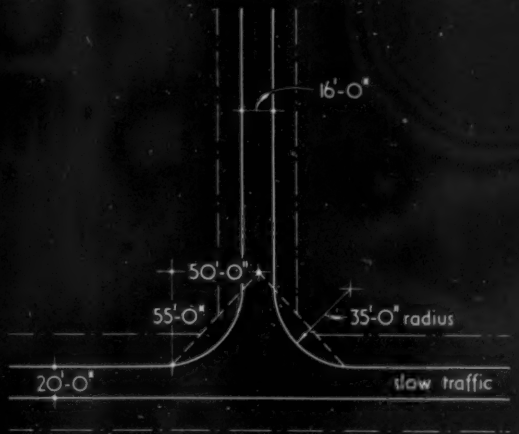
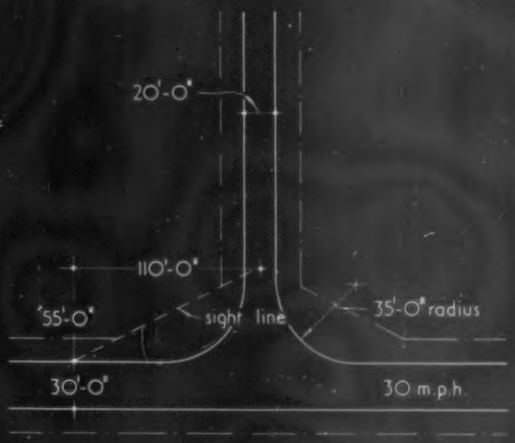
AJ SfB (14)

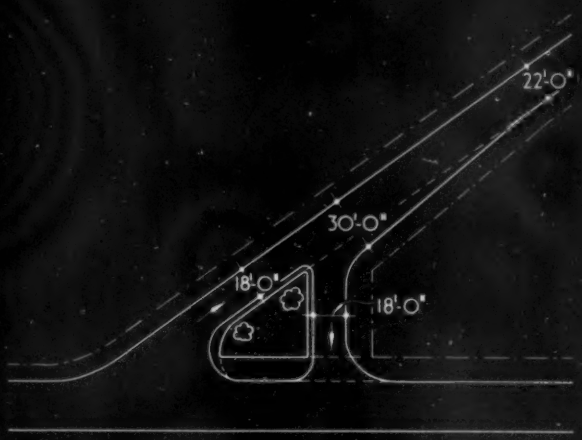
Information Sheet No 1011 UDC 625·73

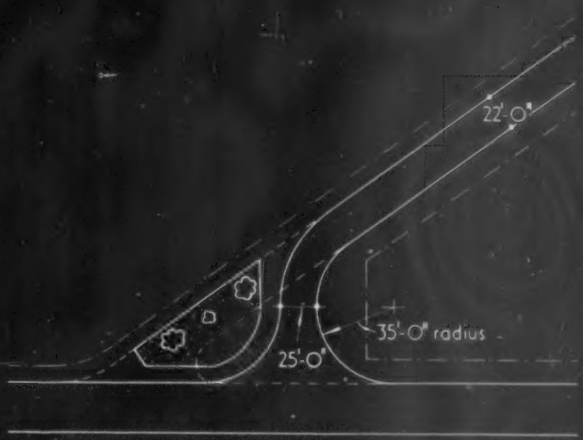
Roads and Pavings: General



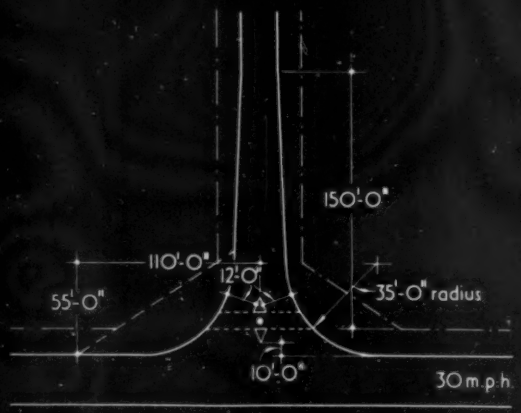


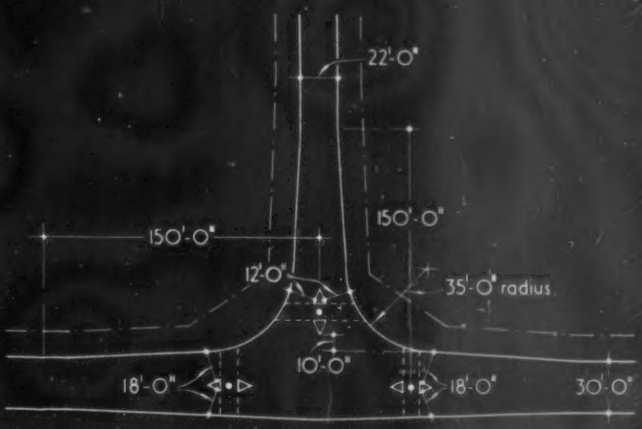
T - JUNCTIONS





ANGLE JUNCTIONS





REFUGES AT JUNCTIONS

ROAD JUNCTIONS AND TURNING CIRCLES

ROAD JUNCTIONS AND TURNING CIRCLES

This Sheet deals with the planning of road junctions to give good sight lines for traffic, adequate turning allowances and safe crossings for pedestrians. It is based on information contained in *Design and Layout of Roads in Built-up Areas*, published for the Ministry of Transport.

T-Junctions

The diagrams on the upper face of the Sheet show two layouts for a T-junction, one where the through road traffic is unlikely to exceed a speed of 20 mph and the other where it is likely to maintain a speed of approximately 30 mph.

Angle Junctions

Acute-angle junctions between roads should always be avoided but where the layout of existing roads makes this impracticable, the junction can be replanned, as shown in the two centre drawings on the face of the Sheet, so that the minor road actually enters the major road at right angles. The areas consequently disused should be raised and turfed, or planted with shrubs, so that the rearrangement is perfectly clear to drivers when visibility is poor. The new kerb-line should be marked with reflecting discs.

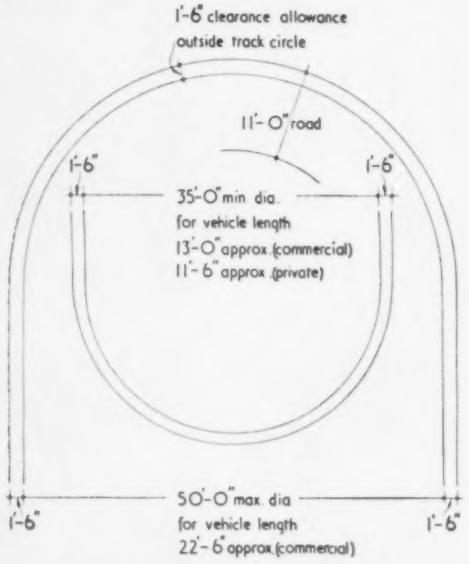
Refuges at Junctions

Refuges may be required at road junctions to guide traffic or for the safety of pedestrians. Where the same refuge serves both purposes, a compromise must be found between the position best suited to the control of vehicles and that least liable to render pedestrians vulnerable to drivers whose attention is centred on other traffic. It should therefore normally be sited so that the end nearer the intersection is not less than 10 ft behind the kerb-line of the major road.

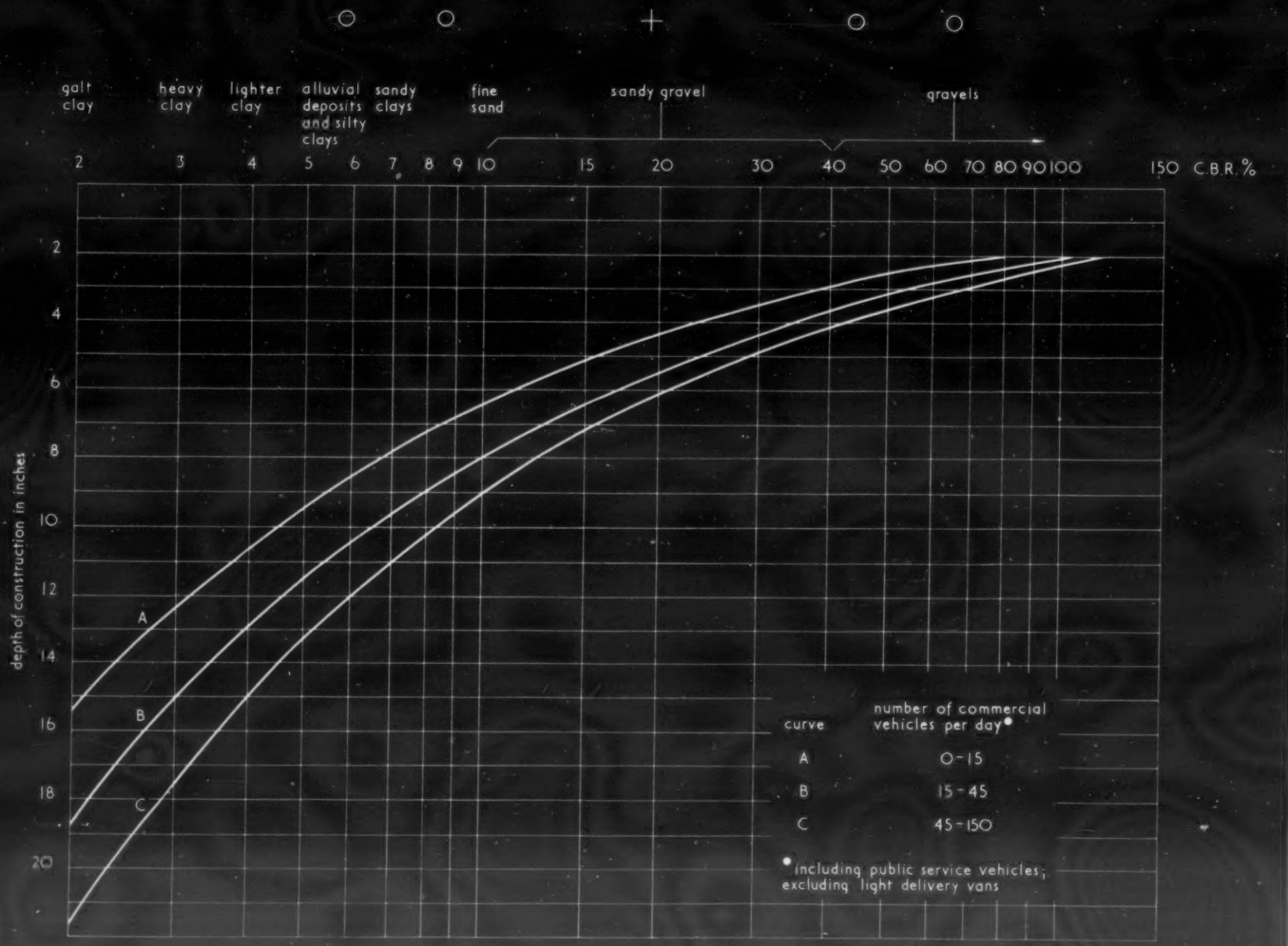
The refuges in the major road, not usually the architect's concern, should be placed as near to the intersection as possible allowing for the safe turning of large vehicles. The aggregate width of carriageway on the two sides of the refuge should be equal to the general width of the road. On roads of 30 ft and over, the minimum width on either side should be 18 ft. In order to obtain these widths the road must be widened towards the refuges as shown in the diagrams on the lower face of the Sheet.

Turning Circles

The diagram below shows the maximum and minimum turning circles required for motor vehicles based on their overall length.



The modifications of design affecting length of wheel base and steering lock have not been taken into account as these constantly vary as new models come on the market.



CALIFORNIAN BEARING RATIO.

AJ SfB (14)

Information Sheet No 1012 UDC 625.7

Roads and Pavings: General

CALIFORNIAN BEARING RATIO

This Sheet describes an empirical method of determining the thickness and selecting the materials for a road structure. Based on experiments initiated by Californian road engineers, data have been compiled relating to the thickness of structure required for differing soil and traffic conditions. The strength of the soil or material used is expressed as a percentage of the strength of crushed limestone and is known as the Californian Bearing Ratio (CBR).

Testing

Tests on the sub-grade may be made either on the site or in a laboratory. The equipment used is a standard apparatus and the services of a specialist laboratory are required. Testing is normally unwarranted on lengths of road up to about $\frac{1}{2}$ mile, unless possibility of failure of the sub-grade is anticipated. As an approximation, the CBR of varying formations can be assumed from the following data:

Soft clay	2–4 per cent
Firm clay	4–10 per cent
Sand/gravel	10–40 per cent
Gravel	40 + per cent

Most soils have a CBR between 3 and 15 per cent and the design should be based on the poorest present.

Tests should be carried out when the sub-grade is in its worst condition for moisture content and density. More tests are necessary for coarse-grained soils and a minimum of six specimens is required. CBR tests are also made on the road materials.

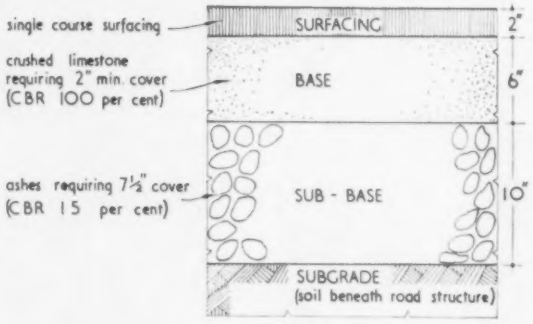
Use of Graph

The graph on the face of the Sheet can be used to design a road structure for given traffic conditions and the following example demonstrates its application.

A road is to be constructed to carry normal housing-estate road traffic and up to 50 public service vehicles per day. The sub-soil is uniform over the whole length of the road and has been found to have a design CBR of 3 per cent. The road will be surfaced with a pre-mixed bituminous surfacing; ashes, with a CBR of 15 per cent, and crushed limestone, with a CBR of 100 per cent, are available for the construction of the sub-base and base respectively.

The road must be designed by curve C, which indicates that the total thickness of construction needed is 18 in. This curve also shows that the ashes (CBR 15 per cent) must be covered by at least $7\frac{1}{2}$in of stronger material, and the crushed limestone (CBR 100 per cent) requires a surfacing 2in thick.

All the design requirements will be met by a structure built up as shown in the following diagram:



In this example the base material was assumed to have a CBR of 100 per cent. It frequently happens, however, in practice that the base has a CBR greatly in excess of 100 per cent and is itself capable of carrying the traffic loads without damage. In such circumstances, all that is necessary in the way of surfacing is a protective layer which will keep the water out of the structure and stop abrasion of the base by traffic. A double surface dressing with hot binder and chippings or a thin veneer of dense surfacing material will fulfil these functions.

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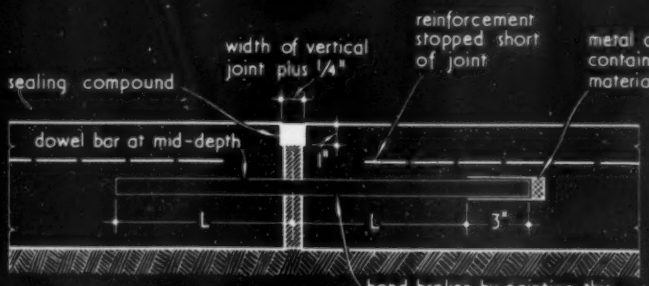
AJ SfB (14)

Information Sheet No 1013 UDC 625·7

Roads and Pavings: General

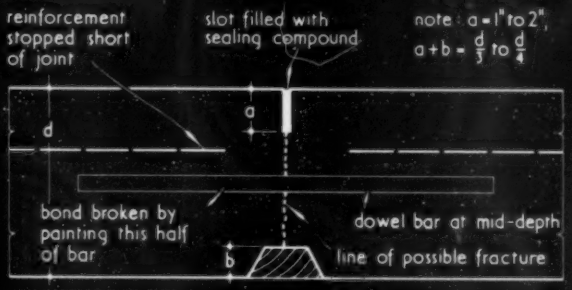


typical section

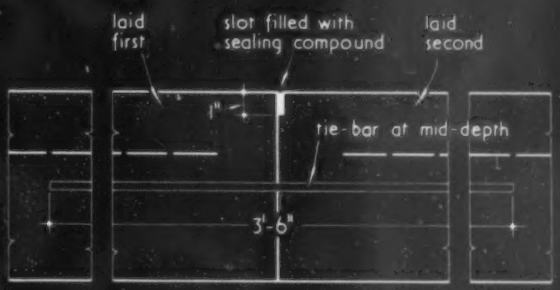
EXPANSION JOINT

thickness of slab (in)	dia. of dowel bars(in)	length of dowel bars(in)
4 and 5	not recommended	
6 and 7	3/4	20
8 and 9	1	24
10 to 12	1 1/4	28

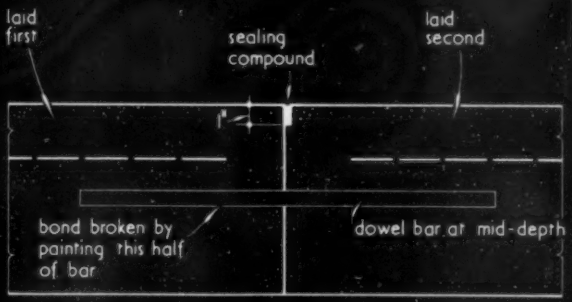
table of sizes



fracturing controlled by slot and batten

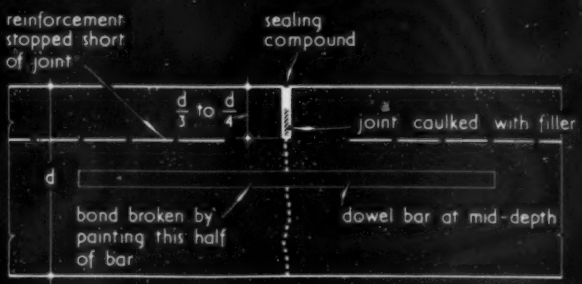


butted construction joint



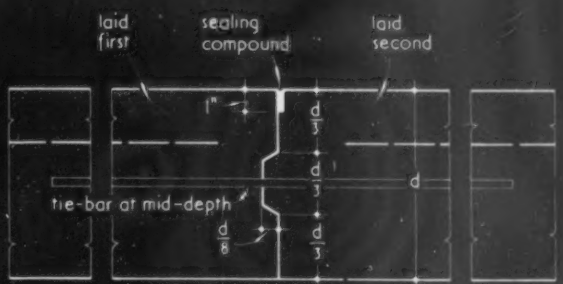
butted construction joint

fracturing controlled by slot and batten



fracturing controlled by deep slot

CONTRACTION JOINTS



tongued and grooved construction joint

LONGITUDINAL JOINTS

ROAD CONSTRUCTION : MOVEMENT JOINTS

CALIFORNIAN BEARING RATIO

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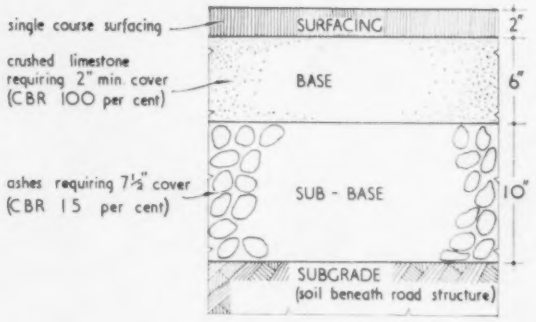
The road must be designed by curve C, which indicates that the total thickness of construction needed is 18 in. This curve also shows that the ashes (CBR 15 per cent) must be covered by at least 7½in of stronger material, and the crushed limestone (CBR 100 per cent) requires a surfacing 2in thick.

All the design requirements will be met by a structure built up as shown in the following diagram:



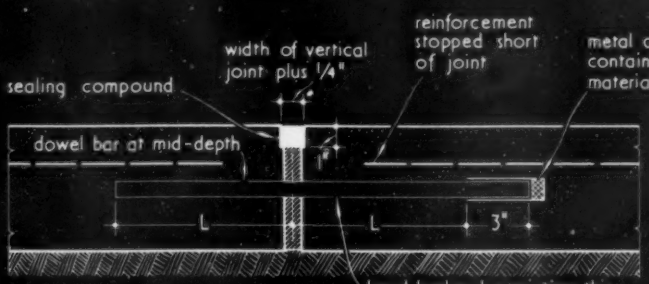
In this example the base material was assumed to have a CBR of 100 per cent. It frequently happens, however, in practice that the base has a CBR greatly in excess of 100 per cent and is itself capable of carrying the traffic loads without damage. In such circumstances, all that is necessary in the way of surfacing is a protective layer which will keep the water out of the structure and stop abrasion of the base by traffic. A double surface dressing with hot binder and chippings or a thin veneer of dense surfacing material will fulfil these functions.

The Architects' Journal Information Library October 18 1961

AJ SfB (14)

Information Sheet No 1013 UDC 625·7

Roads and Pavings: General

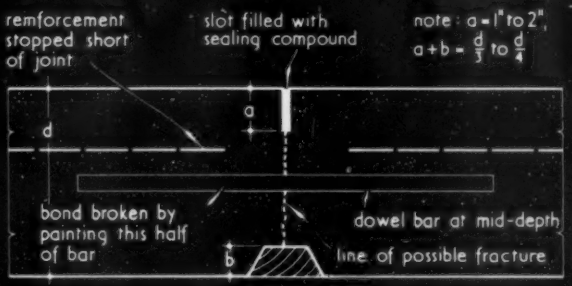


typical section

EXPANSION JOINT

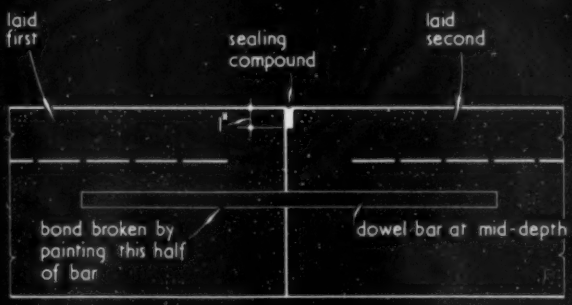
thickness of slab (in.)	dia. of dowel bars(in)	length of dowel bars(in)
4 and 5	not recommended	
6 and 7	3/4	20
8 and 9	1	24
10 to 12	1 1/4	28

table of sizes

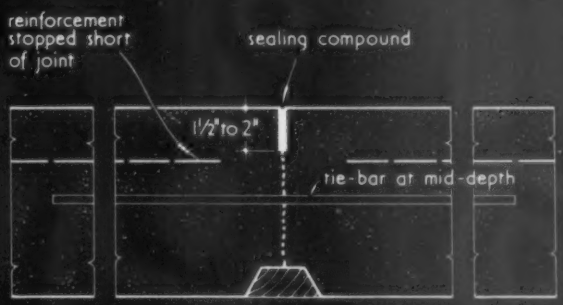


fracturing controlled by slot and batten

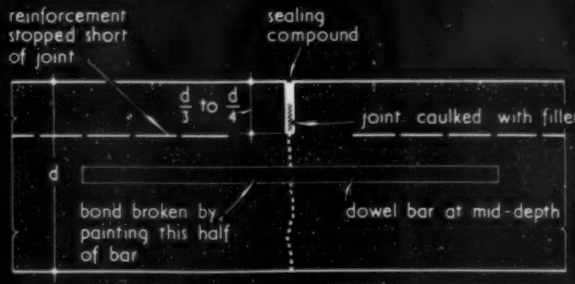
butted construction joint



butted construction joint

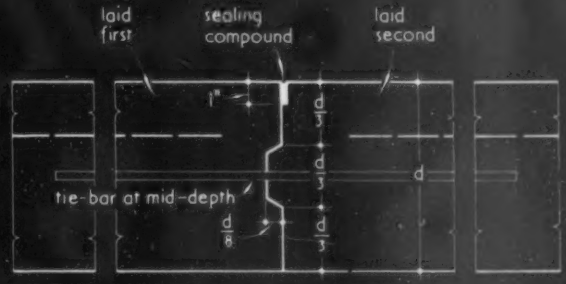


fracturing controlled by slot and batten



fracturing controlled by deep slot

CONTRACTION JOINTS



tongued and grooved construction joint

LONGITUDINAL JOINTS

ROAD CONSTRUCTION : MOVEMENT JOINTS

ROAD CONSTRUCTION: MOVEMENT JOINTS

This Sheet describes the joints which must be provided in concrete road structures to prevent excessive stresses by controlling the effects of expansion, contraction and warping due to changes in temperature and moisture content.

Application

Joints may be transverse or longitudinal and in order to be effective they must
(1) limit the effective length of slabs, thereby limiting the stress due to sub-grade restraint.
(2) provide space for slabs to expand in length.
Expansion joints : These are transverse joints spaced at suitable intervals to allow for expansion.
Contraction joints: These may be required between expansion joints to limit the length of slab to reduce stresses: they enable lighter reinforcement to be used to control cracking.
Both expansion and contraction joints must permit adjacent slabs to move freely horizontally, therefore no reinforcement or tie bars should be carried through the joints.
Longitudinal joints: These are provided to prevent random longitudinal cracks. They must allow warping to take place but unlike transverse joints must not be allowed to open. Therefore, except where traffic is extremely light (less than 45 commercial vehicles per day) tie bars must be used or the reinforcement carried through.
Construction joints: Where an unavoidable interruption of the road work occurs, an expansion or contraction joint should be formed, as appropriate.

Construction requirements

Joints should satisfy the following conditions:
(1) They should be permanently waterproof to prevent softening of the sub-grade by surface water.
(2) They must be economical to construct.
(3) They must not affect the longitudinal section of the road and thereby its riding qualities.
(4) The filler must not extrude and they must be sealed with material which prevents the ingress of grit etc. to spall the concrete edges.

Design

The drawings on the face of the Sheet show typical designs for expansion, contraction and longitudinal joints and should be studied in conjunction with the following notes.
Expansion joints : The dowel bars should be at 1ft 0in centres and parallel. They should also be parallel with the centre line of the road ($\frac{1}{8}$in maximum tolerance) and to its surface. The filler must be compressible without extrusion and must recover after compression, eg softwood (knot-free), partly-compressed chipboard, impregnated fibre-board, cork, cellular rubber. Materials containing a high proportion of bitumen should not be used owing to the risk of extrusion. For mechanised construction the more rigid type of filler is preferable. The filler should extend the full depth and width of the slab. The ends of the slabs must be square, vertically and horizontally, and the gap between them at no point less than the specified joint width.
Contraction joints : Where the slab is 6in or more thick and traffic intensity greater than 150 commercial vehicles per day, dowel bars of the same length and spacing as for expansion joints should be provided, but they may be $\frac{1}{4}$in less in diameter. The drawings on the face of the Sheet show the slot (which permits the crack occurring at this point to open) at the top of the slab: the practice of forming the slot entirely at the bottom of the slab is not recommended as it leads to irregular cracking and spalling at the surface.
Longitudinal joints : These should be provided at 15ft 0in centres. The tie bars shown in the examples given on the face of the Sheet should be $\frac{1}{2}$in in diameter and spaced at 2ft 6in centres. As an alternative to separate tie-bars, special reinforcement fabric can be used across the joint incorporating extra rods of equivalent cross-sectional area to the tie-bars.
Sealing compound: To be effective, this must not crack in winter or flow in summer and it must adhere well to concrete. It must be sufficiently elastic to resist the penetration of stones under traffic. Tests to assess the properties of hot-applied compounds are described in BS 2499: there is no BS to date for cold-applied materials. The level of the sealing compound should always be below the surface of the road, so that it does not extrude in ridges.
Arrangement: Transverse joints should be in line on either side of a longitudinal joint, not staggered. At road junctions, joints must be so arranged as to avoid acute-angled intersections, as these can produce corner cracks in the concrete.

Spacing of Joints

The following table gives the recommended spacing of joints based on anticipated traffic density. Alternative spacings and weights of reinforcement are given, which should be compared when calculating the cost of any particular job. Normally, it is more economical to use closer spacing of joints and lighter reinforcement: on small sites, expansion joints alone simplify construction.

Total daily average flow of commercial vehicles in both directions	Approximate thickness of slab (in)	Minimum weight of reinforcement (lb/sq yd)*	Maximum spacing of expansion joints (ft)†	Maximum spacing of contraction joints (ft)	Width of expansion joints (in)
1,500–3,000	9	10	120	none	$\frac{1}{4}$ (1)
	9	$5\frac{1}{2}$	240 (180)	60	1
	9	$7\frac{1}{2}$‡	240 (160)‡	80‡	1
450–1,500	8	10	120	none	$\frac{1}{4}$ (1)
	8	$5\frac{1}{2}$	240 (180)	60	1
	8	$7\frac{1}{2}$‡	240 (160)‡	80‡	1
150–450	7	7	80	none	$\frac{1}{4}$ (1)
	7	$4\frac{1}{2}$	160 (120)	40	1
45–150	6	7	80	none	$\frac{1}{4}$ (1)
	6	$4\frac{1}{2}$	160 (120)	40	1
	8	none	120 (90)	15	1

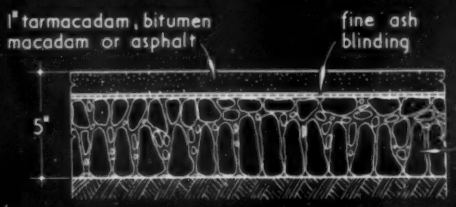
Note: Figures in brackets apply to use in cold weather only.
*The minimum weights of reinforcement refer to oblong mesh fabric to the quality specified in BS 1221 : 1945 *Steel fabric for concrete reinforcement.*
†The spacings apply to roads laid on smooth bases or sub-grades. Concrete made with limestone aggregate may need less provision for expansion. If desired narrow joints may be used at closer spacings provided the total expansion space is not less than that given.
‡These figures should be used for roads expected to carry 500 or more loads per year of 30 tons or over.

The Architects' Journal Information Library October 18 1961

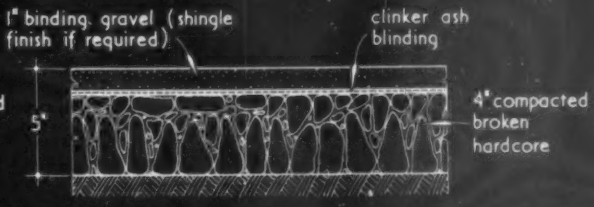
AJ SfB (14)

Information Sheet No 1014 UDC 625·8

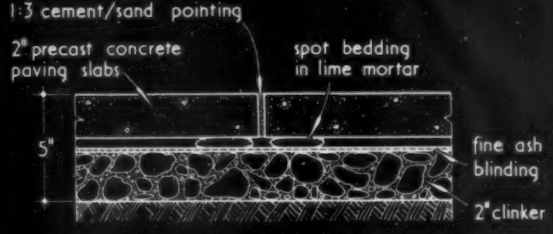
Roads and Pavings: General



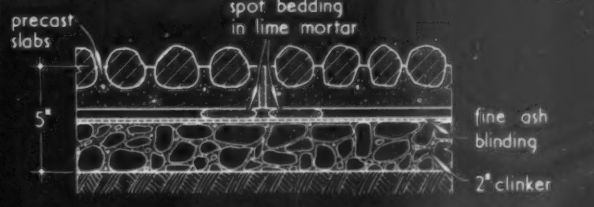
TARMACADAM OR BITUMEN SURFACING



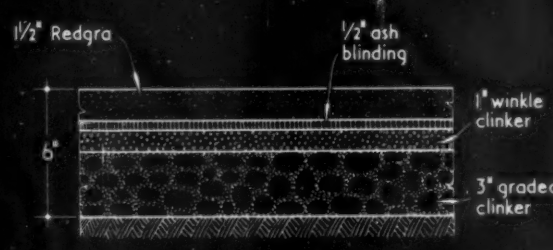
GRAVEL SURFACING



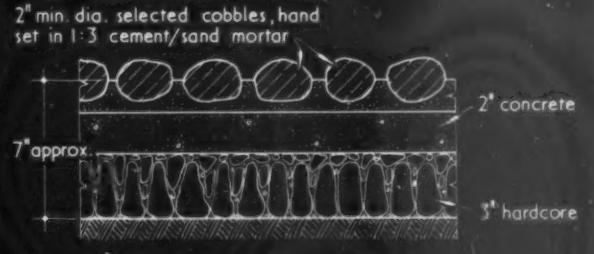
PRECAST CONCRETE PAVING



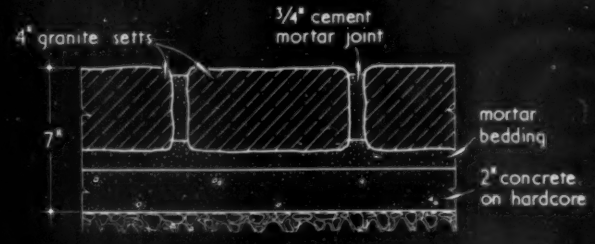
PRECAST EXPOSED-AGGREGATE OR COBBLE SLABS



REDGRA SURFACING. [Thomas Roberts (Westminster) Ltd.]

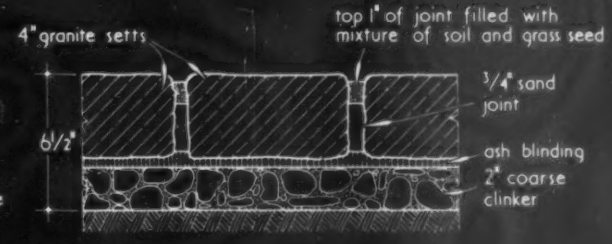


COBBLE PAVING

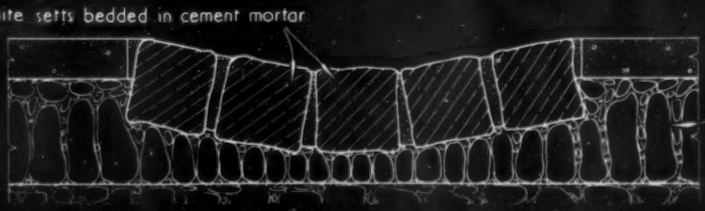


setts laid on mortar bedding

GRANITE SETT PAVING



setts laid dry



GRANITE SETT GUTTER

PAVEMENT SURFACINGS

PAVEMENT SURFACINGS

This Sheet describes various surfacings for pavements. The drawings on the face illustrate recommended methods of bedding the surfacings and the following notes describe the various materials.

Bitumen and Tarmacadam Surfacings

Bitumen macadam: Bitumen macadam consists of aggregate and bitumen mixed under controlled conditions. It has a preponderance of coarse aggregate and a substantial proportion of voids.

Tarmacadam: This is of similar composition and prepared in the same way as bitumen macadam, but using road tar or tar-bitumen instead of bitumen.

Asphalt: Asphalt is a mixture of mineral aggregates, sand and a filler (fine powder), with bitumen. Many proprietary mixes are available. Cold asphalt is more commonly used for pavings than hot asphalt, but the latter is very durable for use where this quality is important.

Unsealed Gravel

This may be obtained from pits or river beds, or it may consist of quarry chippings. In either case local sources should be cheaper and more suitable. It is laid loose and rolled: the gravel finish can consist of a finer layer over a coarser one.

Redgra [*Thomas Roberts (Westminster) Ltd*]

This is a proprietary material mainly used for sports grounds. It is a finely graded and scientifically prepared mineral aggregate combined with a special binding compound to enable it to withstand hard use in any weather and yet remain sufficiently porous to drain rapidly when it is wet. It is red in colour.

Precast Pavings

Plain or moulded slabs: Plain-pressed or textured moulded slabs are available: there are also some textured pressed slabs on the market. They can be coloured if required: BS 1014 gives standards for pigments. BS 368 *Precast concrete flags* generally covers concrete and pre-cast stone slabs as there is no BS for the latter.

Exposed aggregate or cobble slabs: A wide range of colours and textures is available: very sharp or smooth-polished stones should be avoided. Cheaper aggregates are incorporated by moulding them into the slab and then removing the surface fines, whereas more expensive aggregates are scattered on the surface of the slab shortly after casting and tamped in. Cobbles are incorporated by bedding them on sand, casting the slab over them and brushing the sand away when the concrete is set.

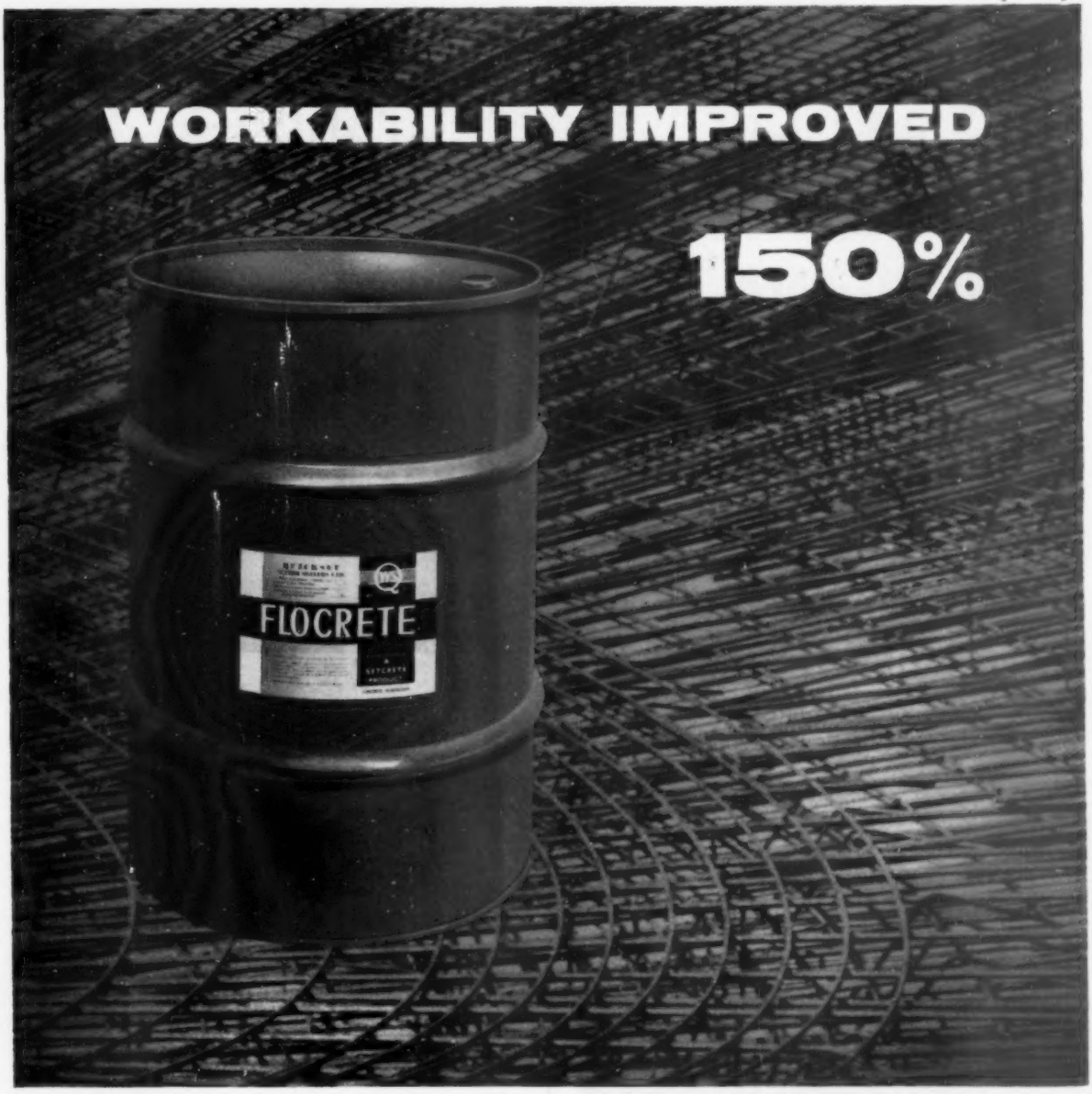
Cobbles

These are largely procured from beaches or river beds but the following sources are also possible; gravel pits, where flint rejects can be inspected; cement works who use chalk rather than limestone as their raw material; potteries, where wash mill flints (grey, pitted stones, like pumice in appearance) are sometimes obtainable. Cobbles are sold in graded sizes up to 4in. They may be laid random, roughly coursed or deliberately set in patterns. Selected cobbles are set as shown in the drawing on the face of the Sheet, flushed up to half their diameter and excess mortar cleaned off at once. The finished level of the cobbles should be slightly above any surrounding surfaces.

Granite Setts

This is the most durable type of paving in existence and though seldom used today for whole roads etc is extremely useful for channels beside roads and demarcation purposes. The drawings on the face of the Sheet show two methods of bedding, in mortar, filling the joints and cleaning off the surplus immediately, or dry, with joints filled with soil and grass seed.

SfB (14)



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AJ SfB (14)

Roads and Pavings : General

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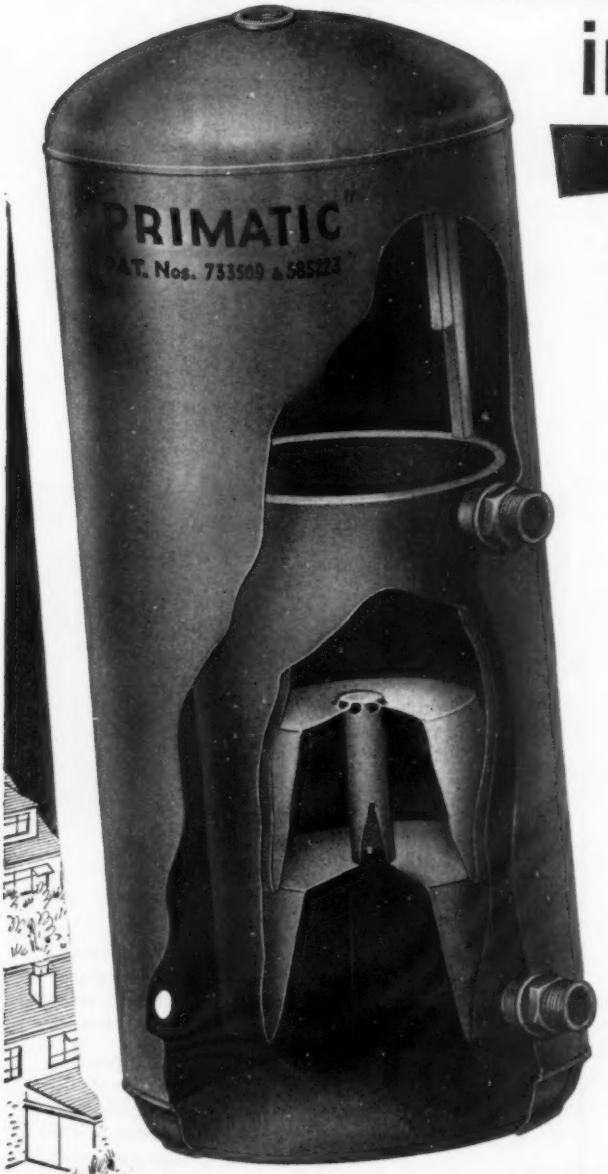

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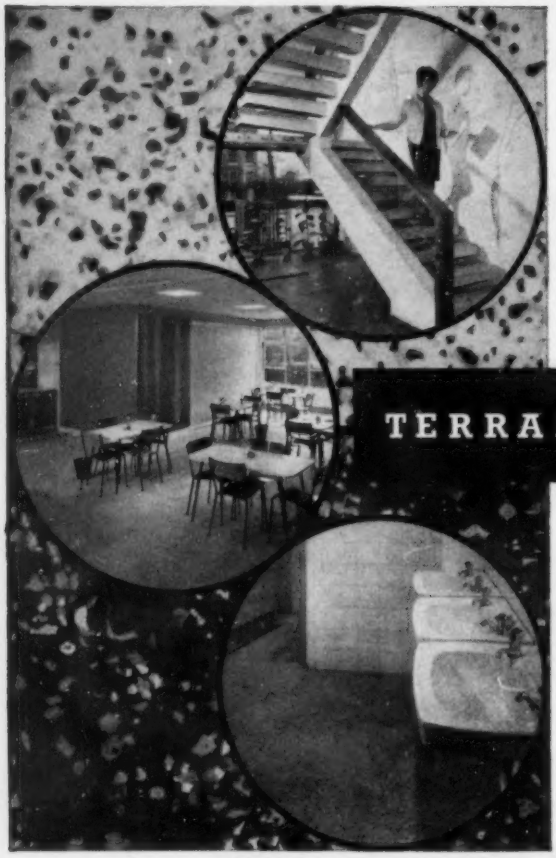

TERRAZZITE Decorative FLOORING

Left Hand Illustration: Works Canteen with Terrazite decorative flooring. Photograph by courtesy of Hunt Barnard & Co. Ltd., Aylesbury.

Right Hand Illustration: Staircase balustrade and cloakrooms using Terrazzite. Photos by courtesy of R. Seifert & Partners, Chartered Architects, London W.C.1.

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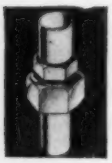

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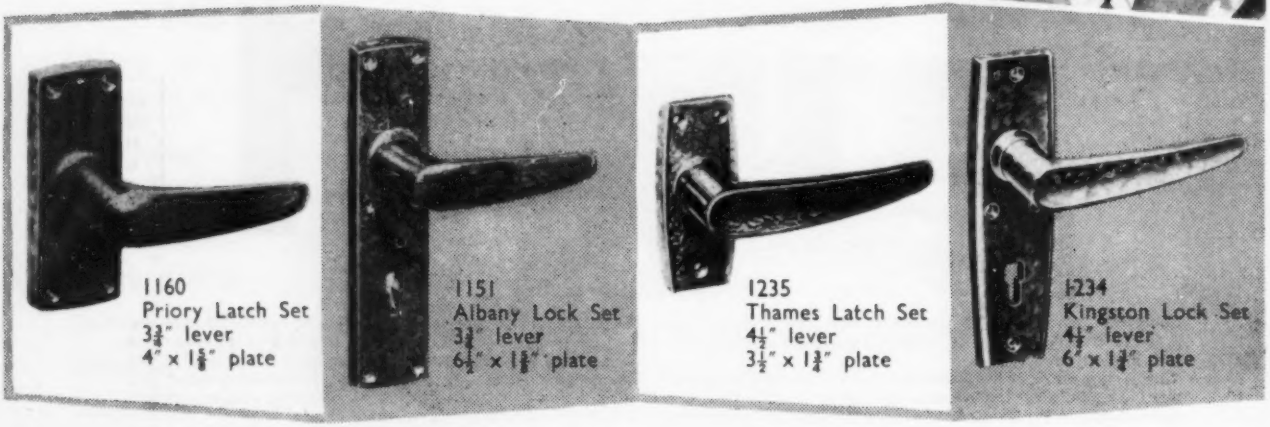

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4" x 1⅝" plate

1151
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1235
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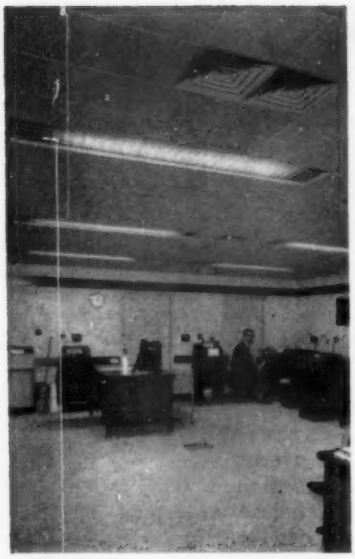
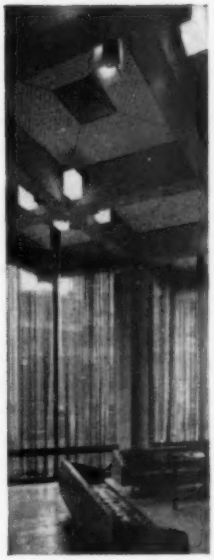




AIRMASTERS BY FAIRITT

IN THE AMERICAN EMBASSY

Exacting air conditions, some requiring deep cooling depressions, are obtained with draught-free diffusion at the new United States Embassy in London, by using Airmaster diffusers.

In order to meet the Architect's requirements and to conform with the decor and design of the building, special types of Airmasters were developed and tested at the Airmaster Works.

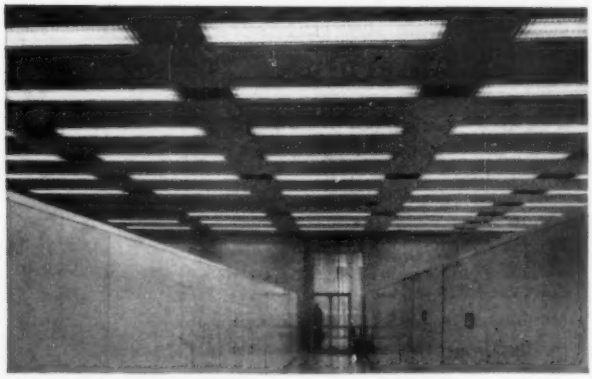
There are, in addition, over 2,000 standard Airmaster diffusers available for normal purposes. Catalogues and leaflets giving full technical information are available.

Acknowledgements:

Consulting Engineers for Services: A. F. MYERS & PARTNERS.

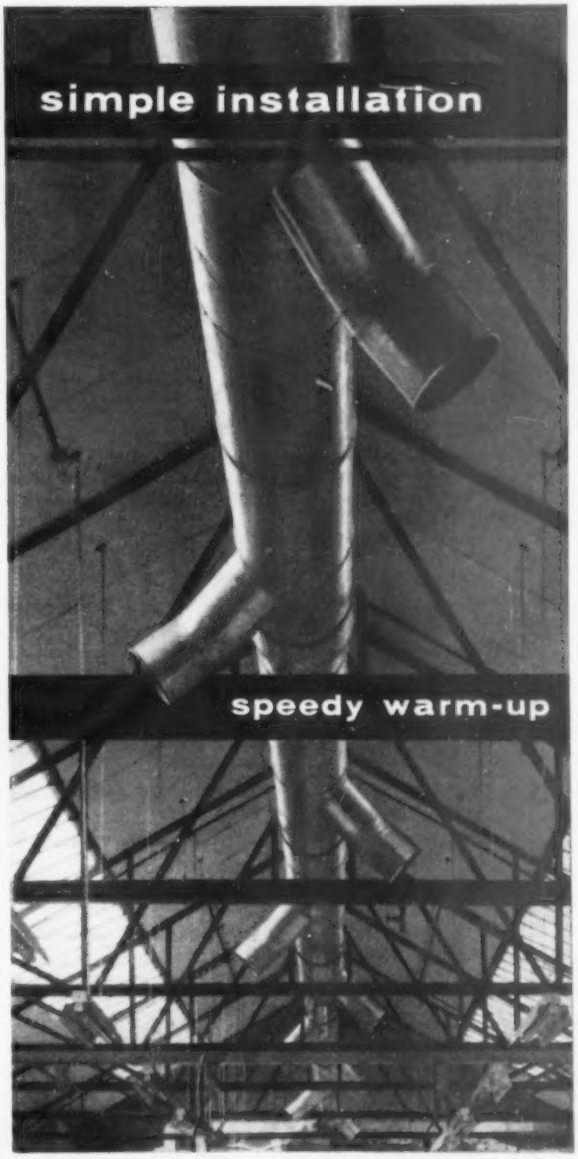
Architects:

EERO SAARINEN & ASSOCIATES in association with YORKE, ROSENBERG & MARDALL.

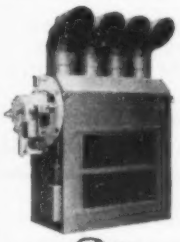


FAIRITT ENGINEERING CO. LTD.

101 SANDFORD ROAD, MOSELEY, BIRMINGHAM 13.
Phone: SOUTH 3651.
604 GRAND BUILDINGS, TRAFALGAR SQUARE,
LONDON, W.C.2. PHONE: WHITEHALL 4805.



take a fresh look at warm air heating



New advances in technique mean that ducted warm-air heating can dramatically increase comfort—drastically reduce costs in commercial buildings and factories of every shape and size.

Rubery Owen are the people to give you the facts. They manufacture a wide range of heating units from 100,000 to 1,500,000 b.t.u./hr. incorporating the Greaves patent 3-pass heat exchanger. Their installation record is extremele impressive and they are backed by the vast resources of the Owen Organisation.

Rubery Owen Heating will send you literature for your files; better, will show you one of their recent installations; best of all will prepare a complete speculative scheme—you will almost certainly find it offers considerably advantages over conventional methods.

P.S. For really big installations, Rubery Owen Heating manufacture equipment using the heavier and far cheaper grades of oil.

RUBERY OWEN (HEATING) LTD

Rubery Owen (Heating) Ltd., Lord Street, Wolverhampton. Staffs.
Tel: 24973. *Member of the Owen Organisations*

The Imdugud Relief, outstanding among discoveries made at Al-'Ubaid, of art works incorporating copper and bitumen . . . and dated c.3100 B.C. Reproduced by courtesy of the British Museum.

What will last . . . 5,000 years?

Copper and native bitumen are known to have been in use as long ago as 3100 B.C. *because* the weatherproof and corrosion-resistant properties of these materials have helped to preserve for 20th Century eyes relics of unbelievably ancient civilisations.

TODAY this same time-tested combination of Copper and native bitumen now derived from the great Trinidad Asphalt 'lake' provides modern building with COPPERTRINDA — the finest hand-made dampcourse in the world.

COPPERTRINDA

for lasting protection

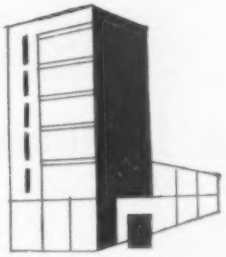
A sample of COPPERTRINDA will be sent to you immediately upon request to

ENGERT & ROLFE LIMITED

Dept. A.J.17

Barchester Street London E14

Tel. EAST 1441



Will Engert & Rolfe arrange to have a sample of COPPERTRINDA sent to

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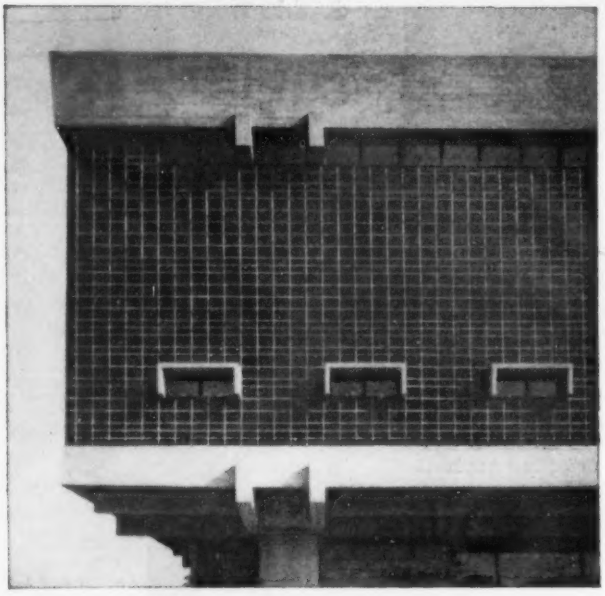

New Japanese Architecture

by Udo Kultermann

Western opinion has an ideal image of modern Japanese architecture: spare, elegant, informal. While the work of Junzo Sakakura seemed to support this, there is an increasing awareness that in Kenzo Tange Japan possesses an architect who probably ranks with the world's top ten, but practises an entirely different kind of architecture.

Dr Kultermann's book shows how different the work of Tange and other leading Japanese architects has turned out to be. It is not afraid of mass, thickness and solidity; not afraid of bold plastic and sculptural forms; not afraid to mate the most advanced technology with the most hallowed traditional usages.

All these qualities are brought out in dramatic photographs, backed by analytical texts and biographies of leading architects. Since some of these men were born within a few years of Mendelsohn and Le Corbusier, the modern architecture of Japan rests on a tradition almost as old as that of the West. As a result, Japan's new architecture has nothing unpractised or unconvincing about it, but is already so secure in its aims that the Japanese themselves speak of it not as a foreign importation, but simply as the re-awakening of Japanese architecture.

The Architectural Press
9–13 Queen Anne's Gate, London, S.W.1.

Size 11¼ × 8¾ ins. 212 pages. 180 half-tone illustrations. 63*s. net*. Postage 2*s*.

CLASSIFIED ADVERTISEMENTS

Advertisements should be addressed to the Advertisement Manager, "The Architects' Journal," 9, 11 and 13, Queen Anne's Gate, Westminster, S.W.1, and must reach there by first post Friday morning for inclusion in the following Wednesday's paper.
Replies to Box Numbers should be addressed care of "The Architects' Journal," at the address given above.

AIR-MAIL SERVICE available on request.
In response to requests from a number of Overseas subscribers for air-mail delivery of Public and Official Appointment details and Other Appointments Vacant, we have been pleased to arrange that cuttings of all such classified advertisements appearing in the A.J., shall be despached by air-mail each week. The cost of this special service to Overseas subscribers will be 5s. for four weeks (1s. 3d. for each additional week) and prepayment should be sent by subscribers wishing to take advantage of this service. The charge we are making represents only the actual cost of the postage involved.

Public and Official Announcements

36s. per inch; each additional line 3s.

NEWCASTLE REGIONAL HOSPITAL BOARD
EXPANSION OF ARCHITECTURAL DEPARTMENT
P. H. KNIGHTON, M.B.E., A.R.I.B.A.,
REGIONAL ARCHITECT
ARCHITECTURAL STAFF

The Board has prepared a 10-years programme containing a large number and variety of major hospital projects. Planning and building is already current on schemes costing about £15,000,000. As the programme includes also a wide range of buildings which are not peculiar to hospitals, good general experience as well as specialist experience may be gained.

Applications are invited for the following (superannuable) posts:

1. SENIOR ASSISTANT ARCHITECTS
(£1,300 × £60 (5)—£1,600)

Open to registered architects with experience in the design and construction of major public buildings. Experience of hospital work desirable but not essential. Assistance with removal expenses if appointee at present in a lower-graded Health Service post.

2. ASSISTANT ARCHITECTS
(£905 × £35 (1) × £45 (6) × £50 (2)—£1,310).

Applicants must have passed the R.I.B.A. Final Examination. For registered architects increments can be given above the bottom of the grade in accordance with relevant practical experience.

Qualified but unregistered architects can enter the Architectural Assistant scale at a salary point of £865 per annum with a view to entering the Assistant Architect grade when registered.

3. ARCHITECTURAL ASSISTANTS
(£625 × £30 (9) × £35 (1)—£900).

Intermediate R.I.B.A. and preferably some practical experience.

4. ARCHITECTURAL DRAUGHTSMEN
(£475 × £25 (6) × £30 (2)—£685).

Three years' previous experience in an architect's drawing office and good draughtsmanship required.

Evening study facilities available at King's College of Durham University in Newcastle.

A five-day working week is in operation.

Details of training, qualifications, experience, present salary etc., with the names of three referees, should reach the Secretary to the Board, Benfield Road, Newcastle upon Tyne, 6, not later than 25th October, 1961. Canvassing will disqualify. S9638

BOROUGH OF RAWTENSTALL
APPOINTMENT OF
ARCHITECTURAL ASSISTANT

Applications are invited for the above permanent appointment at a salary within A.P.T. IV (£1,140—£1,310 per annum). Applicants should be members of the R.I.B.A.

The appointment will be subject to the provisions of the Local Government Superannuation Acts, the National Scheme of Conditions of Service and the termination by one month's notice by either side. Housing accommodation will be available.

Applications including names and addresses of two referees should reach the undersigned not later than Monday, the 23rd October, 1961. Canvassing will disqualify. Any relationship to members or senior officers of the Council must be disclosed.

COLIN CAMPBELL.
Town Clerk.

Town Hall,
Rawtenstall,
Rossendale,
Lancs. 9596

METROPOLITAN BOROUGH OF
CAMBERWELL
ARCHITECTS

Vacancies for Architects in the Borough Architect's Department within a salary range of £855 and £1,525 (Grades A.P.T. II to V of the National Scales). Grade and commencing salary according to qualifications and experience. The work of the department includes design and construction of public buildings, housing estates, including multi-storey construction. Application form from Town Clerk, Town Hall, S.E.5. TC7928

BOROUGH OF SOLIHULL
APPOINTMENT OF PRINCIPAL ASSISTANT ARCHITECT (HOUSING)
and
PRINCIPAL ASSISTANT QUANTITY SURVEYOR

Applications are invited for the above appointments in the Architects' Section of the Borough Engineer and Surveyor's Department at salaries within Scale A (£1,400 per annum—£1,565 per annum), commencing according to experience and qualifications of the successful applicants. In addition, a casual user car allowance is applicable for each post.

The Council will be prepared to assist in providing housing accommodation as soon as possible and the whole of the reasonable removal expenses of the persons appointed will be paid, subject to twelve months' service with the Council.

Each appointment will be subject to the usual Local Government Conditions of Service and to a satisfactory medical examination.

The Council have a large capital programme of schools, housing, health and welfare buildings and a swimming bath, etc., and the Authority has been recommended for County Borough status by the Local Government Commission in its final report on the West Midlands Special Review Area.

Applications, giving full particulars as to age, qualifications, present and past appointments and experience, together with the names and addresses of two persons to whom reference can be made, should be submitted to the Borough Engineer and Surveyor, 90, Station Road, Solihull, not later than Friday, 27th October, 1961.

W. MAURICE MELL,
Town Clerk.

The Council House,
Solihull.
4th October, 1961. S9659

COUNTY BOROUGH OF DUDLEY
ASSISTANT ARCHITECTS

Appointments in Borough Architect's Department APT. Grade IV/V—£1,140—£1,480, commencing salaries according to qualifications and experience.

Applicants must be A.R.I.B.A.

Limited housing accommodation is available.

Applications, stating age, qualifications, present and past appointments, experience, together with the names and addresses of two referees, to be received by me as soon as possible.

P. D. WADSWORTH,
Town Clerk.

The Council House,
Dudley,
Worcs.
3rd October, 1961. 9657

WILTSHIRE COUNTY COUNCIL
COUNTY ARCHITECT'S DEPARTMENT

Applications are invited for the post of GROUP LEADER, Scale "B" (£1,450—£1,670), who must be an Associate of the Royal Institute of British Architects and have had at least five years' experience on major projects.

The appointment is subject to medical examination, the National Scheme of Conditions of Service and the provisions of the Local Government Superannuation Acts, 1937-53, and determinable by one month's notice in writing on either side.

Applications should be submitted on forms to be obtained from the County Architect. Completed forms, accompanied with the names and addresses of three referees should be returned to the Clerk of the County Council, County Hall, Trowbridge, within 14 days after the appearance of this advertisement. 9729

CORPORATION OF LONDON
CITY SURVEYOR'S OFFICE
ARCHITECTURAL & BUILDING DIVISION

invite applications for appointment of SITE ARCHITECT for the redevelopment of a section of London Central Markets, Smithfield; for approximately three years at a salary of up to £1,480.

Applicants should be fully qualified architects with experience of construction and supervision of major building contracts. Consideration will be given to candidates of Intermediate standard having the required experience.

Write, giving full details of experience, age, etc. and previous positions, with names of two referees, within 14 days, to City Surveyor, Guildhall, E.C.2. S9597

METROPOLITAN BOROUGH OF
CAMBERWELL
ARCHITECTS

Vacancies for Architects in the Borough Architect's Department within a salary range of £855 and £1,525 (Grades A.P.T. II to V of the National Scales). Grade and commencing salary according to qualifications and experience. The work of the department includes design and construction of public buildings, housing estates, including multi-storey construction. Application form from Town Clerk, Town Hall, S.E.5. TC9602

LANCASHIRE COUNTY COUNCIL
COUNTY ARCHITECT'S DEPARTMENT

A vacancy exists in a newly formed group in the County Architect's Department for a qualified and enthusiastic ASSISTANT ARCHITECT with a dominant interest in organisation and management processes.

The appointment will be within the salary scale A.P.T. V (£1,310—£1,480), and application forms may be obtained from the County Architect, P.O. Box 26, County Hall, Preston, to be returned not later than the 10th November. S9717

URBAN DISTRICT COUNCIL OF CORBY
APPOINTMENT OF
SENIOR ARCHITECTURAL ASSISTANT

Applications are invited for this appointment from qualified Architects of not less than five years' experience (including the period of theoretical training).

Salary within Grade A.P.T. IV (£1,140—£1,310 per annum) according to experience.

Corby is a rapidly expanding town and the Council's building programme will provide opportunities for good experience.

Housing accommodation will be available to the successful candidate, if married.

Forms of application may be obtained from the undersigned, to whom they should be returned by not later than Monday, 23rd October, 1961. Testimonials will be required only from applicants selected for interview.

G. B. BLACKALL,
Clerk of the Council.

Council Offices,
Corby,
Northants.
29th September, 1961. 9591

COUNTY BOROUGH OF DARLINGTON
BOROUGH ARCHITECT'S DEPARTMENT

Applications are invited for the following appointments:—

One SENIOR ASSISTANT ARCHITECT (Group Leader). Salary—Grade V of N.J.C. Scales (£1,310—£1,480).

Two SENIOR ASSISTANT ARCHITECTS. Salary—Grade IV of N.J.C. Scales (£1,140—£1,310).

One ASSISTANT ARCHITECT. Salary—Grade II of N.J.C. Scales (£815—£960).

One DRAUGHTSMAN. Salary—General Division of N.J.C. Scales (£455, aged 22, to £630).

One JUNIOR QUANTITY SURVEYOR. Salary—Grade I of N.J.C. Scales (£645—£815).

The department has a large programme including Secondary and Primary Schools, Welfare Schemes, Housing, Municipal Offices, Markets and Central Redevelopment. Preference will be given to candidates experienced in this class of work and who are, in the case of architects, members of the R.I.B.A.

Applicants for the post of Junior Quantity Surveyor should be experienced in the preparation of Bills of Quantities, interim valuations, and the settling up of final accounts.

Applications, stating post and giving full particulars of age, qualifications, present appointment with salary, previous appointments with dates, and name and address of three referees, to be received by E. A. Tornbohm, A.R.I.B.A., A.M.T.P.I., Borough Architect, Central Buildings, Darlington, not later than 30th October, 1961.

Consideration will be given to provision of housing accommodation, if required. S9668

SURREY COUNTY COUNCIL

Applications invited for appointment of ASSISTANT ARCHITECT Grade IV (£1,140—£1,310 p.a. plus £45 p.a. London Allowance). Must be A.R.I.B.A. and have had experience in preparation of drawings and specifications and be capable of assuming responsibility for medium to large scale contracts.

Some housing accommodation available.

Applications stating age, qualifications, education and experience, present salary and three copy testimonials, preferably one from present employer, to County Architect, County Hall, Kingston, as soon as possible, marked (H) in top lefthand corner. 9643

CITY OF PORTSMOUTH EDUCATION COMMITTEE
COLLEGE OF ART
Hyde Park Road,
PORTSMOUTH

Principal: W. J. L. Gaydon, A.R.C.A.

The Governors invite applications for a post of SENIOR LECTURER in the School of Architecture. Duties to commence, if possible, before January 1962.

The person appointed will be responsible mainly for thesis research, design and construction in the Fifth Year of the Diploma Course. Considerable ability in design is required for this post.

Candidates must be professionally well qualified and possess appropriate experience in architectural practice and teaching.

Salary: £1,550 × £50—£1,750 per annum (at present under review).

Further particulars and forms of application are obtainable from the Registrar. S9671

LONDON COUNTY COUNCIL
ARCHITECT'S DEPARTMENT

The Town Development Division has vacancies for ARCHITECTS with design ability and practical experience to work on town centre shopping, housing and public building projects and on new factories for industrial estates. Salaries up to £1,500.

Architects with little experience, but with much enthusiasm also welcomed—salaries according to selection board assessment.

Form and particulars from Hubert Bennett, F.R.I.B.A., Architect to the Council, (EK/A/2804/10) County Hall, S.E.1. S9720

LANDSCAPE ARCHITECTS AND ASSISTANTS for preparation of working drawings and specifications and supervision of contracts for new parks, playing fields, grounds of housing estates, etc.

Salary up to £1,250 (£1,100 for Assistants), starting points according to qualifications and experience.

Apply to Chief Officer, (AI/A/2856/10), L.C.C. Parks Department, County Hall, S.E.1 (WATerloo 5000, Ext. 8076). 9732

ADMINISTRATIVE COUNTY OF LEICESTER
(*a*) PRINCIPAL ASSISTANT ARCHITECT, £1,410—£1,565.
(*b*) CHIEF ASSISTANT ARCHITECTS, £1,310—£1,480.
(*c*) SENIOR ASSISTANT ARCHITECTS, £1,140—£1,310.

Candidates for (*a*) must be members of the R.I.B.A., have had sound experience and be capable of acting as Group Leaders on an extensive programme of education buildings. Candidates for (*b*) must be members of the R.I.B.A., have had considerable office experience and be capable of taking charge of contracts from inception to completion. For (*c*), should be members of the R.I.B.A., have had office experience and be capable of taking charge of small contracts. Lodging allowance and removal expenses may be paid to a married man. Apply on form obtainable from County Architect, 123, London Road, Leicester. TC9044

LONDON COUNTY COUNCIL
ARCHITECT'S DEPARTMENT

ARCHITECTS and BUILDING SURVEYORS required for surveying existing buildings, preparing sketch schemes, working drawings and specifications and supervising works in progress for the complete internal modernisation of the older type of Council flats designed by the Council and for the rehabilitation of dwellings acquired by the Council. Jobs up to £100,000.

Applicants should have a taste for rehabilitation and should be able to act on their own judgment and take complete responsibility for jobs from survey to completion. Salaries up to £1,250.

Form and particulars from Hubert Bennett, F.R.I.B.A., Architect to the Council, (EK/A/2833/10), County Hall, S.E.1. S9721

CITY AND ROYAL BURGH OF DUNFERMLINE
DEPUTE BURGH ARCHITECT AND TOWN PLANNING OFFICER

Applications are invited for the post of DEPUTE BURGH ARCHITECT AND TOWN PLANNING OFFICER on the salary scale (£1,165 × 5 annual increments of £45 to £1,390).

Applicants should be qualified Members of the Royal Institute of British Architects, and also of the Town Planning Institute. Preference will be given to those with local authority and Town Planning experience.

The post is superannuable, and has been designated by the Town Council for priority housing.

Detailed applications, giving names of two referees, should be submitted to Leonard Howarth, A.R.I.B.A., A.M.T.P.I., A.R.I.A.S., Burgh Architect and Town Planning Officer, 6, Abbot Street, Dunfermline, within seven days.

J. DOUGLAS,
Town Clerk.

City Chambers,
Dunfermline. 9723

WEST SUFFOLK COUNTY COUNCIL

Applications are invited from suitably qualified persons for the following posts:—

(*a*) SENIOR ASSISTANT ARCHITECT—within Grade "A" (£1,320—£1,565); this post subject to two months' notice on either side; travelling allowance at casual user rate.
(*b*) JUNIOR ARCHITECTURAL ASSISTANT—within A.P.T. I (£645—£815).
(*c*) ASSISTANT QUANTITY SURVEYOR—within A.P.T. II-III (£815—£1,140). Applicants should have passed the Intermediate Examination of the R.I.C.S. (Quantities Division) or I.Q.S.

Appointments subject to National Conditions of Service; medical examination; five-day week; schemes for payment of removal expenses and housing separation allowances in operation.

Application forms obtainable from the County Architect, 13, Westgate Street, Bury St. Edmunds, to be returned as soon as possible. 9707

LANCASHIRE COUNTY COUNCIL
PLANNING DEPARTMENT

PLANNING ASSISTANTS required at LIVERPOOL, WIGAN and BURY, A.P.T. I to A.P.T. IV (£645—£1,310), commencing and maximum salary according to qualifications and experience. Candidates should have an appropriate University degree and/or be studying for or possess a recognised qualification in town planning, architecture, surveying or engineering.

Disturbance allowances and removal expenses to a maximum of £125 may be granted in approved cases.

Applications giving age, qualifications, present appointment, experience, etc., and two referees to the County Planning Officer (N), East Cliff County Offices, Preston, by the 31st October, 1961. 9743

LANCASHIRE COUNTY COUNCIL
COUNTY ARCHITECT'S DEPARTMENT
ASSISTANT ARCHITECTS
A.P.T. IV (£1,140—£1,310)

Applications are invited from qualified Architects of initiative, keen on design and modern constructural methods, to work on a large and varied programme.

If appointed, applicants will be able to claim a disturbance allowance up to a maximum of £125, a facility offered by the County Council to cover the expenses of removal and other associated costs.

Application forms and details of appointment, obtainable from the County Architect, P.O. Box 26, County Hall, Preston, should be returned by the 10th November. 9710

CITY OF STOKE-ON-TRENT
CITY ARCHITECT'S DEPARTMENT

Applications are invited for the following appointments to form a new Electrical Engineering Group in the City Architect's Department.

(*a*) SENIOR ASSISTANT ELECTRICAL ENGINEER—Grade A.P.T. V.—£1,310—£1,480.
(*b*) TWO ASSISTANT ELECTRICAL ENGINEERS—Grade A.P.T. III—£960—£1,140.

The person appointed to post (*a*) will be in charge of the Electrical Engineering Group and should preferably hold Corporate membership of the I.E.E., or Degree standard and wide experience in installation and contracting work.

Candidates for posts (*b*) should be properly trained Electrical Engineers of not less than Higher National Certificate standard.

Applicants must have had design and estimating experience as Consumers or Contracts Engineers and be capable of preparing designs and specifications for electrical installations for buildings, including Housing, Schools and other Public Buildings.

Previous Local Authority experience desirable but not essential. Commencing salaries within the above grades according to qualifications and experience.

Applications giving details of qualifications, training and previous experience and names of two referees to be sent to J. R. PIGGOTT, T.D., F.R.I.B.A., City Architect, Kingsway, Stoke-on-Trent, not later than Friday, 3rd November, 1961.

HARRY TAYLOR,
Town Clerk.
9742

AYCLIFFE DEVELOPMENT CORPORATION
(NEW TOWN OF NEWTON AYCLIFFE)
ARCHITECTURAL ASSISTANTS

Applications are invited for the above appointments at salaries within Grades A.P.T. III and IV, i.e. £960—£1,310 p.a.

The principal work for the successful applicants will be in connection with the development of the Town Centre and new forms of housing layout.

Appointments subject to N.J.C. Conditions, superannuation, medical examination and to one month's notice, in writing, on either side.

A variety of housing accommodation is available.

Newton Aycliffe has, at present, a population of about 12,000 with schools, shops and some social facilities. It is within easy reach of some of the most dramatic landscape in England and pleasant attractive dales and moors in Durham and North Yorkshire.

Applications, stating age, education, qualifications and experience, together with the names of two referees, to be sent to the undersigned not later than Monday, the 6th November, 1961.

A. V. WILLIAMS,
General Manager.

Churchill House,
Newton Aycliffe,
Nr. Darlington. S9750

ROBERT GORDON'S TECHNICAL COLLEGE, ABERDEEN
SCOTT SUTHERLAND SCHOOL OF ARCHITECTURE

Head: E. F. DAVIES, B.ARCH. (LVPL.), F.R.I.B.A., F.R.I.A.S.

Owing to development of the work in the School, applications are invited for the following additional new appointments:—

(*a*) LECTURER AND STUDIO INSTRUCTOR (Grade I) in Architectural Design and Constructional Subjects. Salary £1,025 × £50—£1,575 per annum.
(*b*) LECTURER AND STUDIO INSTRUCTOR (Grade II) in Architectural Design and Constructional Subjects. Salary £800 × £40—£1,000 × £45—£1,270 per annum.

The Salary Scales are under revision.

Initial placings with regard to both appointments will be in accordance with qualifications and experience.

The College is recognised for purposes of exemption from the R.I.B.A. Intermediate and Final Examinations.

Candidates should possess the Degree or Diploma of a recognised School of Architecture and must be Associates of the Royal Institute of British Architects.

Further particulars and forms of application may be obtained from the undersigned to whom completed applications should be returned on or before 31st October, 1961.

A. C. WEST,
Director.
9752

SKEGNESS URBAN DISTRICT COUNCIL
ARCHITECTURAL ASSISTANT
(A.P.T. II & III, £815—£1,140)

Applications are invited for the above superannuable appointment in the Engineer and Surveyor's Department at a commencing salary according to experience, etc. Housing available.

Candidates should have had good general architectural experience and be competent to write specifications and prepare estimates, designs, details, etc., for works of a general nature normally undertaken by a progressive seaside authority.

Applications with names and addresses of two referees to the undersigned by 30th October, 1961.

M. TURNER,
Clerk of the Council.

Town Hall,
Skegness.
4th October, 1961. 9676

METROPOLITAN BOROUGH OF GREENWICH
APPOINTMENT OF PRINCIPAL ARCHITECTURAL ASSISTANT

Applications are invited for the appointment of a PRINCIPAL ARCHITECTURAL ASSISTANT in the Borough Engineer and Surveyor's Department. Salary grade A.P.T. V (£1,355—£1,525 per annum, including London Weighting). Commencing salary in accordance with qualifications and experience. Car allowance available.

Candidates should be Registered Architects, preferably Associates of the R.I.B.A., with experience in housing and other municipal projects.

Application forms obtainable from the Borough Engineer and Surveyor are to be returned to him by noon on Friday, 27th October, 1961.

G. C. TURK,
Town Clerk.

Town Hall,
Greenwich,
S.E.10.
October, 1961. 9724

CENTRAL ELECTRICITY GENERATING BOARD
MIDLANDS REGION

FOURTH ASSISTANT ENGINEER
(DRAWING OFFICE)—CIVIL

Applications are invited for the position of Fourth Assistant Engineer (Drawing Office) in the Regional Electrical Engineer's Department.

Candidates should possess a sound practical and technical training, and have experience of design and drawing work for R.C. foundations and building construction.

The work consists of preparation of drawings associated with the construction of H.V. Substations.

Superannuable appointment, commencing salary according to qualifications and experience within the range £920—£1,245 per annum.

Apply, quoting vacancy number 224/61 MR on form A.E.6, available from the Regional Personnel Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 30th October, 1961. 9755

NEW ZEALAND
MINISTRY OF WORKS
TOWN & COUNTRY PLANNING BRANCH, HEAD OFFICE, WELLINGTON

Applications are invited for the undermentioned vacancies:—

VACANCIES 3127 AND 2804 for ASSISTANT PLANNING OFFICERS, PLANNING OFFICERS, and a SENIOR PLANNING OFFICER.

Salary: Up to £1,500 a year as merited.

Qualifications desired: Corporate membership of the Town Planning Institute or equivalent and for Assistant Planning Officers, Intermediate Examination of the Town Planning Institute or equivalent.

Duties: Administrative and technical work within the Town and Country Planning Branch of the Ministry of Works. This involves advanced administration at a central government level including planning reports and assessments, preparation and submission of evidence at statutory hearings and enquiries, preparation of bulletins and leaflets on technical planning matters and research.

Passages:
From United Kingdom: Single persons—up to £172. Married couple—up to £370. Each child—proportion of £172.
From South Africa: £210 per person plus proportion for child.
From other countries: Minimum tourist class fare by the shortest route.

Incidental Expenses: Up to £35 for a single person and £100 for a married man can be claimed to cover the cost of taking personal effects to New Zealand.

Application forms and further details are available from the High Commissioner for New Zealand, 415, Strand, London, W.C.2, with whom applications will close on 30th November, 1961.

Please quote reference B13/20/1 when enquiring. 9713

BOROUGH OF KIDDERMINSTER
BOROUGH ENGINEER & SURVEYOR'S DEPT.
AMENDED ADVERTISEMENT

Applications are invited for the position of ASSISTANT ARCHITECT, Grade III (£960—£1,140). Applicants should have a good experience in design and construction and preference will be given to those who have passed the Intermediate examination of the A.R.I.B.A.

The Council have an interesting programme of work, including Redevelopment and multi-storey housing.

The appointment will be subject to the Local Government Superannuation Acts and the National Scheme of Conditions of Service.

The Council will provide housing accommodation if required and also assist in removal expenses.

Applications, stating qualifications and experience, accompanied by the name of two referees, should be delivered to the Borough Engineer and Surveyor, 110, Mill Street, Kidderminster.

L. L. EVANS,
Town Clerk.

Town Hall,
Kidderminster.
October, 1961. 9712

ARCHITECTS
AND
ASSISTANTS

required for

SHREWSBURY, SWANSEA & CARDIFF OFFICES

Salary according to experience and ability. The design policy of the firm envisages the most progressive approach to projects, and special encouragement is given to initiative and reliability by promotion and Staff plus Government pension schemes. Five day week, three weeks holiday per annum. Write please giving full information re age, qualifications, experience, appointments held, etc., to the Secretary,

Sir Percy Thomas & Son
10 Cathedral Road
CARDIFF

REBUILDING OF ST. THOMAS' HOSPITAL

The Architect's Office, St. Thomas' Hospital, London, S.E.1, engaged in the complete rebuilding of an 800 bed teaching hospital and the development of the surrounding area, including major residential and commercial buildings, invites applications for the following appointments:—

1. SENIOR ASSISTANT ARCHITECT
Salary Scale £1,300 × £60(5)—£1,600 + £50 London Weighting. 20 working days leave per annum.
Will be responsible under the Architect for the collection and interpretation of complex user requirements and for initiating subsequent planning, design and construction.

2. ASSISTANT ARCHITECT
Salary Scale £905 × £35(1) × £45(6) × £50(2) —£1,310 + £40 London Weighting. 20 working days leave per annum.
Will assist the Senior Assistant Architect. Should be qualified, with a good knowledge of design and experienced in the preparation for and supervising of construction work, including working with engineering consultants.

3. ARCHITECTURAL ASSISTANT
Salary Scale £625 × £30(8) × £35(1)—£900 + £40 London Weighting. 15—18 working days leave per annum.
Inter R.I.B.A. standard with experience in construction and design applied to large sized-contract.

Applications should be returned to the following address by the 31st October, 1961, indicating post applied for, and giving particulars of education, qualifications and experience, together with the names of two referees who should have been previous employers.

Architect to the Board of Governors,
St. Thomas' Hospital,
45 Lambeth Palace Road, London, S.E.1

THE LAING HOUSING COMPANY LIMITED

REQUIRES

Architects

who should be qualified, preferably with some years' experience. They would be required to work on preliminary investigations for, and the imaginative development of, new housing types in a contemporary idiom compatible with realistic economic conditions.

The Head Office is at Edgware, Middlesex, and the positions are permanent and offer scope for initiative and advancement. There is a pension scheme, and other progressive benefits. Apply—

Personnel Manager, quoting Ref. (PF 10),
John Laing and Son Limited, London, N.W.7

NORTH-EAST METROPOLITAN REGIONAL HOSPITAL BOARD
40, Eastbourne Terrace, W.2

W. G. Plant, Dip.Arch(L'pool), F.R.I.B.A., Regional Architect

HOSPITAL BUILDING PROGRAMME

Appointment of
SURVEYORS

Applications are invited from Quantity and Building Surveyors for the undermentioned posts, which offer exceptional opportunities for gaining experience in a wide, varied and interesting field.

Applicants for posts as Assistant Surveyors should be Corporate Members of the Royal Institution of Chartered Surveyors (Quantities or Building) and Surveying Assistants should have passed the Intermediate examination of the Royal Institution of Chartered Surveyors. The posts are permanent and pensionable, with good prospects of promotion. Five-day week.

Assistant Surveyor

Salary scale £945 to £1,360, the commencing point depending on age and experience. Leave 20 to 23 days.

Surveying Assistant

Salary scale £645 to £940, the commencing point depending on age and experience. Facilities for study purposes may be afforded in suitable cases. Leave 15 to 20 days. Applications, giving age, details of education, professional training, qualifications, experience and past and present appointments, present salary and other relevent details, together with the names and addresses of two referees, should be sent to the Secretary, North-East Metropolitan Regional Hospital Board, 40, Eastbourne Terrace, London, W.2, within 14 days.

ADMINISTRATIVE COUNTY OF LEICESTER

(*a*) PRINCIPAL ASSISTANT ARCHITECT, £1,410—£1,565.

(*b*) CHIEF ASSISTANT ARCHITECTS, £1,310—£1,480.

(*c*) SENIOR ASSISTANT ARCHITECTS, £1,140—£1,310.

Candidates for (*a*) must be members of the R.I.B.A., have had sound experience and be capable of acting as Group Leaders on an extensive programme of education buildings. Candidates for (*b*) must be members of the R.I.B.A., have had considerable office experience and be capable of taking charge of contracts from inception to completion. For (*c*), should be members of the R.I.B.A., have had office experience and be capable of taking charge of small contracts. Lodging allowance and removal expenses may be paid to a married man. Apply on form obtainable from County Architect, 123, London Road, Leicester. TC9044

LONDON COUNTY COUNCIL
ARCHITECT'S DEPARTMENT

ARCHITECTS and BUILDING SURVEYORS required for surveying existing buildings, preparing sketch schemes, working drawings and specifications and supervising works in progress for the complete internal modernisation of the older type of Council flats designed by the Council and for the rehabilitation of dwellings acquired by the Council. Jobs up to £100,000.

Applicants should have a taste for rehabilitation and should be able to act on their own judgment and take complete responsibility for jobs from survey to completion. Salaries up to £1,250.

Form and particulars from Hubert Bennett, F.R.I.B.A., Architect to the Council, (EK/A/2833/10), County Hall, S.E.1. S9721

CITY AND ROYAL BURGH OF DUNFERMLINE
DEPUTE BURGH ARCHITECT AND TOWN PLANNING OFFICER

Applications are invited for the post of DEPUTE BURGH ARCHITECT AND TOWN PLANNING OFFICER on the salary scale (£1,165 × 5 annual increments of £45 to £1,390).

Applicants should be qualified Members of the Royal Institute of British Architects, and also of the Town Planning Institute. Preference will be given to those with local authority and Town Planning experience.

The post is superannuable, and has been designated by the Town Council for priority housing.

Detailed applications, giving names of two referees, should be submitted to Leonard Howarth, A.R.I.B.A., A.M.T.P.I., A.R.I.A.S., Burgh Architect and Town Planning Officer, 6, Abbot Street, Dunfermline, within seven days.

J. DOUGLAS,
Town Clerk.

City Chambers,
Dunfermline. 9723

WEST SUFFOLK COUNTY COUNCIL

Applications are invited from suitably qualified persons for the following posts:—

(*a*) SENIOR ASSISTANT ARCHITECT—within Grade "A" (£1,320—£1,565); this post subject to two months' notice on either side; travelling allowance at casual user rate.

(*b*) JUNIOR ARCHITECTURAL ASSISTANT—within A.P.T. I (£645—£815).

(*c*) ASSISTANT QUANTITY SURVEYOR—within A.P.T. II-III (£815—£1,140). Applicants should have passed the Intermediate Examination of the R.I.C.S. (Quantities Division) or I.Q.S.

Appointments subject to National Conditions of Service; medical examination; five-day week; schemes for payment of removal expenses and housing separation allowances in operation.

Application forms obtainable from the County Architect, 13, Westgate Street, Bury St. Edmunds, to be returned as soon as possible. 9707

LANCASHIRE COUNTY COUNCIL
PLANNING DEPARTMENT

PLANNING ASSISTANTS required at LIVERPOOL, WIGAN and BURY, A.P.T. I to A.P.T. IV (£645—£1,310), commencing and maximum salary according to qualifications and experience. Candidates should have an appropriate University degree and/or be studying for or possess a recognised qualification in town planning, architecture, surveying or engineering.

Disturbance allowances and removal expenses to a maximum of £125 may be granted in approved cases.

Applications giving age, qualifications, present appointment, experience, etc., and two referees to the County Planning Officer (N), East Cliff County Offices, Preston, by the 31st October, 1961. 9743

LANCASHIRE COUNTY COUNCIL
COUNTY ARCHITECT'S DEPARTMENT
ASSISTANT ARCHITECTS
A.P.T. IV (£1,140—£1,310)

Applications are invited from qualified Architects of initiative, keen on design and modern constructural methods, to work on a large and varied programme.

If appointed, applicants will be able to claim a disturbance allowance up to a maximum of £125, a facility offered by the County Council to cover the expenses of removal and other associated costs.

Application forms and details of appointment, obtainable from the County Architect, P.O. Box 26, County Hall, Preston, should be returned by the 10th November. 9710

CITY OF STOKE-ON-TRENT
CITY ARCHITECT'S DEPARTMENT

Applications are invited for the following appointments to form a new Electrical Engineering Group in the City Architect's Department.

(*a*) SENIOR ASSISTANT ELECTRICAL ENGINEER—Grade A.P.T. V.—£1,310—£1,480.

(*b*) TWO ASSISTANT ELECTRICAL ENGINEERS—Grade A.P.T. III—£960—£1,140.

The person appointed to post (*a*) will be in charge of the Electrical Engineering Group and should preferably hold Corporate membership of the I.E.E., or Degree standard and wide experience in installation and contracting work.

Candidates for posts (*b*) should be properly trained Electrical Engineers of not less than Higher National Certificate standard.

Applicants must have had design and estimating experience as Consumers or Contracts Engineers and be capable of preparing designs and specifications for electrical installations for buildings, including Housing, Schools and other Public Buildings.

Previous Local Authority experience desirable but not essential. Commencing salaries within the above grades according to qualifications and experience.

Applications giving details of qualifications, training and previous experience and names of two referees to be sent to J. E. PIGGOTT, T.D., F.R.I.B.A., City Architect, Kingsway, Stoke-on-Trent, not later than Friday, 3rd November, 1961.

HARRY TAYLOR,
Town Clerk.
9742

AYCLIFFE DEVELOPMENT CORPORATION
(NEW TOWN OF NEWTON AYCLIFFE)
ARCHITECTURAL ASSISTANTS

Applications are invited for the above appointments at salaries within Grades A.P.T. III and IV, i.e. £960—£1,310 p.a.

The principal work for the successful applicants will be in connection with the development of the Town Centre and new forms of housing layout.

Appointments subject to N.J.C. Conditions, superannuation, medical examination and to one month's notice, in writing, on either side.

A variety of housing accommodation is available.

Newton Aycliffe has, at present, a population of about 12,000 with schools, shops and some social facilities. It is within easy reach of some of the most dramatic landscape in England and pleasant attractive dales and moors in Durham and North Yorkshire.

Applications, stating age, education, qualifications and experience, together with the names of two referees, to be sent to the undersigned not later than Monday, the 6th November, 1961.

A. V. WILLIAMS,
General Manager.

Churchill House,
Newton Aycliffe,
Nr. Darlington. S9750

ROBERT GORDON'S TECHNICAL COLLEGE, ABERDEEN
SCOTT SUTHERLAND SCHOOL OF ARCHITECTURE

Head: E. F. DAVIES, B.ARCH. (LVPL.), F.R.I.B.A., F.R.I.A.S.

Owing to development of the work in the School, applications are invited for the following additional new appointments:—

(*a*) LECTURER AND STUDIO INSTRUCTOR (Grade I) in Architectural Design and Constructional Subjects. Salary £1,025 × £50—£1,575 per annum.

(*b*) LECTURER AND STUDIO INSTRUCTOR (Grade II) in Architectural Design and Constructional Subjects. Salary £800 × £40—£1,000 × £45—£1,270 per annum.

The Salary Scales are under revision.

Initial placings with regard to both appointments will be in accordance with qualifications and experience.

The College is recognised for purposes of exemption from the R.I.B.A. Intermediate and Final Examinations.

Candidates should possess the Degree or Diploma of a recognised School of Architecture and must be Associates of the Royal Institute of British Architects.

Further particulars and forms of application may be obtained from the undersigned to whom completed applications should be returned on or before 31st October, 1961.

A. C. WEST,
Director.
9752

SKEGNESS URBAN DISTRICT COUNCIL
ARCHITECTURAL ASSISTANT
(A.P.T. II & III, £815—£1,140)

Applications are invited for the above superannuable appointment in the Engineer and Surveyor's Department at a commencing salary according to experience, etc. Housing available.

Candidates should have had good general architectural experience and be competent to write specifications and prepare estimates, designs, details, etc., for works of a general nature normally undertaken by a progressive seaside authority.

Applications with names and addresses of two referees to the undersigned by 30th October, 1961.

M. TURNER,
Clerk of the Council.

Town Hall,
Skegness.
4th October, 1961. 9676

METROPOLITAN BOROUGH OF GREENWICH
APPOINTMENT OF PRINCIPAL ARCHITECTURAL ASSISTANT

Applications are invited for the appointment of a PRINCIPAL ARCHITECTURAL ASSISTANT in the Borough Engineer and Surveyor's Department. Salary grade A.P.T. V (£1,355—£1,525 per annum, including London Weighting). Commencing salary in accordance with qualifications and experience. Car allowance available.

Candidates should be Registered Architects, preferably Associates of the R.I.B.A., with experience in housing and other municipal projects.

Application forms obtainable from the Borough Engineer and Surveyor are to be returned to him by noon on Friday, 27th October, 1961.

G. C. TURK,
Town Clerk.

Town Hall,
Greenwich,
S.E.10.
October, 1961. 9724

CENTRAL ELECTRICITY GENERATING BOARD
MIDLANDS REGION

FOURTH ASSISTANT ENGINEER
(DRAWING OFFICE)—CIVIL

Applications are invited for the position of Fourth Assistant Engineer (Drawing Office) in the Regional Electrical Engineer's Department.

Candidates should possess a sound practical and technical training, and have experience of design and drawing work for R.C. foundations and building construction.

The work consists of preparation of drawings associated with the construction of H.V. Substations.

Superannuable appointment, commencing salary according to qualifications and experience within the range £920—£1,245 per annum.

Apply, quoting vacancy number 224/61 MR on form A.E.6, available from the Regional Personnel Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 30th October, 1961. 9755

NEW ZEALAND
MINISTRY OF WORKS
TOWN & COUNTRY PLANNING BRANCH, HEAD OFFICE, WELLINGTON

Applications are invited for the undermentioned vacancies:—

VACANCIES 3127 AND 2804 for ASSISTANT PLANNING OFFICERS, PLANNING OFFICERS, and a SENIOR PLANNING OFFICER.

Salary: Up to £1,500 a year as merited.

Qualifications desired: Corporate membership of the Town Planning Institute or equivalent and for Assistant Planning Officers, Intermediate Examination of the Town Planning Institute or equivalent.

Duties: Administrative and technical work within the Town and Country Planning Branch of the Ministry of Works. This involves advanced administration at a central government level including planning reports and assessments, preparation and submission of evidence at statutory hearings and enquiries, preparation of bulletins and leaflets on technical planning matters and research.

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From other countries: Minimum tourist class fare by the shortest route.

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Please quote reference B13/20/1 when enquiring. 9713

BOROUGH OF KIDDERMINSTER
BOROUGH ENGINEER & SURVEYOR'S DEPT.
AMENDED ADVERTISEMENT

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The Council have an interesting programme of work, including Redevelopment and multi-storey housing.

The appointment will be subject to the Local Government Superannuation Acts and the National Scheme of Conditions of Service.

The Council will provide housing accommodation if required and also assist in removal expenses.

Applications, stating qualifications and experience, accompanied by the name of two referees, should be delivered to the Borough Engineer and Surveyor, 110, Mill Street, Kidderminster.

L. L. EVANS,
Town Clerk.

Town Hall,
Kidderminster.
October, 1961. 9712

ARCHITECTS
AND
ASSISTANTS

required for

SHREWSBURY, SWANSEA & CARDIFF OFFICES

Salary according to experience and ability. The design policy of the firm envisages the most progressive approach to projects, and special encouragement is given to initiative and reliability by promotion and Staff plus Government pension schemes. Five day week, three weeks holiday per annum. Write please giving full information re age, qualifications, experience, appointments held, etc., to the Secretary,

Sir Percy Thomas & Son
10 Cathedral Road
CARDIFF

REBUILDING OF ST. THOMAS' HOSPITAL

The Architect's Office, St. Thomas' Hospital, London, S.E.1, engaged in the complete rebuilding of an 800 bed teaching hospital and the development of the surrounding area, including major residential and commercial buildings, invites applications for the following appointments:—

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Salary Scale £1,300 × £60(5)—£1,600 + £50 London Weighting. 20 working days leave per annum.
Will be responsible under the Architect for the collection and interpretation of complex user requirements and for initiating subsequent planning, design and construction.

2. ASSISTANT ARCHITECT
Salary Scale £905 × £35(1) × £45(6) × £50(2) —£1,310 + £40 London Weighting. 20 working days leave per annum.
Will assist the Senior Assistant Architect. Should be qualified, with a good knowledge of design and experienced in the preparation for and supervising of construction work, including working with engineering consultants.

3. ARCHITECTURAL ASSISTANT
Salary Scale £625 × £30(8) × £35(1)—£900 + £40 London Weighting. 15—18 working days leave per annum.
Inter R.I.B.A. standard with experience in construction and design applied to large sized-contract.

Applications should be returned to the following address by the 31st October, 1961, indicating post applied for, and giving particulars of education, qualifications and experience, together with the names of two referees who should have been previous employers.

Architect to the Board of Governors,
St. Thomas' Hospital,
45 Lambeth Palace Road, London, S.E.1

THE LAING HOUSING COMPANY LIMITED

REQUIRES

Architects

who should be qualified, preferably with some years' experience. They would be required to work on preliminary investigations for, and the imaginative development of, new housing types in a contemporary idiom compatible with realistic economic conditions.

The Head Office is at Edgware, Middlesex, and the positions are permanent and offer scope for initiative and advancement. There is a pension scheme, and other progressive benefits. Apply—

Personnel Manager, quoting Ref. (PF 10),
John Laing and Son Limited, London, N.W.7

NORTH-EAST METROPOLITAN REGIONAL HOSPITAL BOARD
40, Eastbourne Terrace, W.2

W. G. Plant, Dip.Arch(L'pool), F.R.I.B.A., Regional Architect

HOSPITAL BUILDING PROGRAMME

Appointment of
SURVEYORS

Applications are invited from Quantity and Building Surveyors for the undermentioned posts, which offer exceptional opportunities for gaining experience in a wide, varied and interesting field.

Applicants for posts as Assistant Surveyors should be Corporate Members of the Royal Institution of Chartered Surveyors (Quantities or Building) and Surveying Assistants should have passed the Intermediate examination of the Royal Institution of Chartered Surveyors. The posts are permanent and pensionable, with good prospects of promotion. Five-day week.

Assistant Surveyor

Salary scale £945 to £1,360, the commencing point depending on age and experience. Leave 20 to 23 days.

Surveying Assistant

Salary scale £645 to £940, the commencing point depending on age and experience. Facilities for study purposes may be afforded in suitable cases. Leave 15 to 20 days. Applications, giving age, details of education, professional training, qualifications, experience and past and present appointments, present salary and other relevent details, together with the names and addresses of two referees, should be sent to the Secretary, North-East Metropolitan Regional Hospital Board, 40, Eastbourne Terrace, London, W.2, within 14 days.

EAST RIDING OF YORKSHIRE COUNTY COUNCIL

Applications are invited for the appointment of a CHIEF QUANTITY SURVEYOR on the staff of the County Architect. The salary will be in accordance with Scale "A" (£1,340—£1,565).

Applicants must be members of the Royal Institution of Chartered Surveyors and have had wide experience in the preparation of estimates, bills of quantities, cost analysis, adjustment of final accounts and other work incidental to such an appointment, including the control of staff.

Applications, giving particulars of age, past and present appointments with salaries, details of experience, together with the names of three referees, should be sent to the County Architect, County Hall, Beverley, not later than Friday, 27th October, 1961.

THOMAS STEPHENSON,
Clerk of the County Council.
9698

BRAINTREE RURAL DISTRICT COUNCIL MEASUREMENT CLERK

Applications are invited for the post of temporary Measurement Clerk, from persons having a good knowledge of building construction, bills of quantities and final measurement. Salary A.P.T. Grade II (£815 to £960 p.a.). N.J.C. Conditions. Five-day week. Car allowance. Applications, giving details of age, qualifications and experience, etc., together with the names and addresses of two referees, to the undersigned by 31st October, 1961.

V. YOUNG,
Clerk of the Council.
St. Peter's Close,
Bocking, Braintree,
Essex. 9696

CUMBERLAND COUNTY COUNCIL

There are vacancies on the staff of the County Architect's Department for ASSISTANT ARCHITECTS on A.P.T. Grades 3, 4 and 5. Applicants must be suitably qualified.

Further particulars and forms of application may be obtained from the County Architect, 15 Portland Square, Carlisle.

G. N. C. SWIFT,
Clerk of the County Council.
9703

OXFORDSHIRE COUNTY COUNCIL COUNTY ARCHITECT'S DEPARTMENT

Applications are invited from suitably qualified persons for the following appointments:—

(*a*) SENIOR ARCHITECT, J.N.C. Scale "B" (£1,410—£1,670).

(*b*) ASSISTANT ARCHITECT, Grade A.P.T. V (£1,310—£1,480).

The Council will pay 50 per cent. of any removal expenses. Five-day working week.

The appointments are permanent, superannuable and subject to a medical examination.

Applications, on forms to be obtained from the undersigned, to be returned by the 6th November, 1961.

ALBERT E. SMITH,
County Architect.
Park End Street Offices,
Oxford. 9776

RE-ADVERTISEMENT
CHESTERFIELD RURAL DISTRICT COUNCIL ASSISTANT ARCHITECT
A.P.T. I-IV, £645—£1,310

Applications are invited for the above appointment at a salary according to qualifications and experience.

(*a*) A.P.T. I for candidates who have completed professional training; or

(*b*) A.P.T. II for candidates with an Intermediate Examination qualification; or

(*c*) A.P.T. III/IV for candidates with a Final Examination qualification.

The appointment is subject to the National Scheme of Conditions of Service, Local Government Superannuation Acts and the passing of a medical examination. Housing accommodation will be provided in appropriate cases and removal expenses will be paid.

Applications, giving details of age, qualifications and experience, together with the names and addresses of two referees, should be delivered to the Clerk, Rural Council House, Saltergate, Chesterfield, by 27th October, 1961. 9699

COUNTY BOROUGH OF MERTHYR TYDFIL APPOINTMENT OF CHIEF ASSISTANT ARCHITECT

Applications are invited for the above appointment on the permanent staff of the Borough Architect, at a salary within A.P.T. V (£1,310—£1,480 per annum). Applicants should be members of the R.I.B.A.

The appointment will be subject to the provisions of the Local Government Superannuation Acts, the National Scheme of Conditions of Service and the termination by one month's notice on either side. Housing accommodation will be available.

Applications, including names and addresses of two referees, should reach the undersigned not later than 23rd November, 1961.

Canvassing will disqualify.

T. S. EVANS,
Town Clerk.
Town Hall,
Merthyr Tydfil.
11th October, 1961. 9711

CITY OF BIRMINGHAM PUBLIC WORKS DEPARTMENT

Applications are invited for the post of CHIEF ASSISTANT BUILDING SURVEYOR. Salary within the Grade A.P.T. V (£1,310—£1,480 per annum).

Candidates should be members of the Royal Institute of Chartered Surveyors or of the Incorporated Association of Architects and Surveyors.

Duties include examination and reporting upon deposited building plans, administration of Building Byelaws and regulations, application of relevant codes of practice, administration of certain sections of the Public Health Acts, Factories Acts, and Highways Act, and supervision of technical and clerical staff.

The post is permanent, superannuable and subject to a medical examination.

Applications, endorsed "Chief Assistant—Building Surveyor," stating qualifications, age and experience, together with the names of two referees, should reach the undersigned not later than the 28th October, 1961.

Canvassing disqualifies.

HERBERT J. MANZONI,
City Engineer and Surveyor.
Baskerville House,
Civic Centre,
Birmingham, 1. 9763

BUCKS COUNTY COUNCIL PLANNING DEPARTMENT

Applications are invited for the post of AREA PLANNING OFFICER in charge of the Amersham/Chesham areas of the County. Man required must be A.M.T.P.I. and A.R.I.B.A. or A.R.I.C.S. and have good experience of design and control of development. Salary J.N.C. Scale "D," £1,710 to £1,975 p.a.

The appointment is superannuable and subject to medical examination.

Application forms from the undersigned must be returned by not later than the 27th October, 1961.

F. B. POOLEY,
County Architect and Planning Officer.
County Offices,
Aylesbury. 9714

COUNTY BOROUGH OF BRIGHTON ASSISTANT ARCHITECTS

Applications are invited for the following appointments in the Borough Surveyor's Department:—

ONE ASSISTANT ARCHITECT, Grade A.P.T. V (£1,310—£1,480).

ONE ASSISTANT ARCHITECT, Grade A.P.T. III (£960—£1,140).
(Applicants for the above posts must have passed the R.I.B.A. Final Examination.)

ONE ASSISTANT ARCHITECT, Grade A.P.T. II (£815—£960).

ONE ASSISTANT ARCHITECT, Grade A.P.T. I (£645—£815).
(Preference will be given to candidates who have passed the R.I.B.A. Intermediate Examination.)

In each case the commencing salary will be on a step in the Grade appropriate to the experience and qualifications of the successful candidates.

Application forms may be obtained from D. J. Howe, M.I.C.E., M.I.Mun.E., Borough Surveyor, Engineer & Planning Officer, and must be returned to him at 26-30, King's Road, Brighton, by noon on Monday, 30th October, 1961.

W. O. DODD,
Town Clerk.
9715

COUNTY BOROUGH OF DEWSBURY DEPARTMENT OF BOROUGH ARCHITECT AND PLANNING OFFICER

Applications are invited for the following appointments within the scope of the grades stated:—

(*a*) TOWN PLANNING ASSISTANT—A.P.T. Grade IV-V (£1,140—£1,480).

(*b*) TWO TOWN PLANNING ASSISTANTS—A.P.T. Grade II (£815—£960).

Successful applicants for posts in (*a*) and (*b*) will be members of a group working on a Review of the Development Plan and on Central Area Redevelopment.

(*c*) ASSISTANT ARCHITECT—A.P.T. Grade IV (£1,140—£1,310).

(*d*) CLERK OF WORKS—A.P.T. Grade II (£815—£960).

The provision of housing accommodation will be considered if required.

Applications for forms and particulars of appointments to A. G. Beckett, A.R.I.B.A., A.M.T.P.I., Borough Architect and Planning Officer, Town Hall, Dewsbury. Closing date 27th October, 1961.

A. NORMAN JAMES,
Town Clerk.
Town Hall,
Dewsbury.
6th October, 1961. 9683

COUNTY BOROUGH OF EAST HAM SENIOR ASSISTANT PLANNING OFFICER GRADE A.P.T. II—£815 to £960 (plus London weighting)

Vacancy in Borough Engineer's Department. Salary above minimum payable according to qualifications and experience.

A subsistence allowance may also be paid over a reasonable period to the person appointed if unable to obtain suitable housing accommodation, necessitating the maintenance of two homes.

Further details and application form (returnable within 10 days) from the Town Clerk, Town Hall, East Ham, E.6. 9774

LANCASHIRE COUNTY COUNCIL COUNTY ARCHITECT'S DEPARTMENT ARCHITECTURAL ASSISTANTS
(within the salary range £645—£960 according to experience and ability)

Applications are invited from Architectural Assistants for appointments to the permanent staff of the County Architect's Department, which is engaged on a large and varied programme of major projects.

Applicants should have attained at least Intermediate R.I.B.A. standard and, within this stage of qualification, have a reasonably varied experience.

Application forms and details of appointment, obtainable from the County Architect, P.O. Box 26, County Hall, Preston, should be returned by the 10th November. S9716

COUNTY BOROUGH OF BARNSLEY BOROUGH ENGINEER AND SURVEYOR AND PLANNING OFFICER'S DEPARTMENT APPOINTMENT OF ASSISTANT ARCHITECT

Applications are invited for the appointment of an ASSISTANT ARCHITECT, GRADE A.P.T. V (£1,310—£1,480). The commencing salary may be fixed above the minimum of this grade.

Candidates must hold a recognised Diploma in Architecture and/or be A.R.I.B.A. and should have had considerable experience in the design and supervision of large building works.

The appointment is superannuable and subject to N.J.C. Conditions of Service, passing of a medical examination and one month's notice on either side.

Housing accommodation can be provided if necessary and 50 per cent. of removal transport expenses will be paid in approved cases.

A five-day week is in operation and staff dining facilities are available.

Applications, stating age, qualifications, present and previous appointments and experience, together with the names of two referees, should be sent to the Borough Engineer, Town Hall, Barnsley, by Monday, 6th November, 1961.

Canvassing will disqualify.

A. E. GILFILLAN,
Town Clerk.
Town Hall,
Barnsley.
October, 1961. S9762

MIDDLESEX COUNTY COUNCIL—COUNTY PLANNING DEPT.

(*a*) DEPUTY AREA PLANNING OFFICER, A.P.T. V (salary £1,310—£1,480). Responsible under Area Planning Officer for Development Control, Survey and Plan. Must be Chartered Town Planner with suitable experience.

(*b*) PRINCIPAL PLANNING ASSISTANT (RESEARCH), A.P.T. V. Supervision of Survey and Research. Suitable qualifications and experience essential.

(*c*) SENIOR PLANNING ASSISTANT, A.P.T. III-IV (salary £960—£1,310). Preference will be given to candidate with architectural qualification and/or experience able to do preliminary work on urban redevelopment schemes.

(*d*) SENIOR PLANNING ASSISTANT (TREES), A.P.T. III/IV. Duties include surveying trees and preparing planting schemes. Requires suitable qualification in landscape architecture and or forestry.

(*e*) TOWN PLANNING ASSISTANT, A.P.T. II (salary £815—£960), for Survey and Plan or Development Control duties. Town Planning experience desirable, but candidates with good university degree considered.

(*f*) TOWN PLANNING DRAUGHTSMAN, A.P.T. I (salary £645—£815). Town Planning or cartographical experience desirable.

All posts: London weighting up to £45 payable in addition to salaries quoted. Prescribed conditions. Car allowance normally granted with posts (*a*), (*b*) and (*d*). Further particulars and application forms from County Planning Officer, 25, Buckingham Gate, London, S.W.1, returnable by 28th October.

(Quote H.596 AJ.) 9766

CITY AND COUNTY OF NEWCASTLE UPON TYNE CITY PLANNING DEPARTMENT

Applications are invited from suitably qualified candidates for the following posts in the Redevelopment Division of the department.

1. LANDSCAPE ARCHITECT, Scale "B" (£1,410—£1,670 p.a.). Must be A.I.L.A., preferably with additional Planning Qualification.
2. ASSISTANT LANDSCAPE ARCHITECT, Grade A.P.T. III/IV (£960—£1,310 p.a.). Must be appropriately qualified.
3. ASSISTANT PLANNING OFFICER (Design), Grade IV (£1,140—£1,310 p.a.). Suitably qualified and preferably with design experience.

Commencing salaries commensurate with qualifications and experience.

The appointments are subject to the National Scheme of Conditions of Service, the Local Government Superannuation Acts, and the passing of a medical examination.

In suitable cases the Council are prepared to offer to successful candidates:—

(*a*) Payment of 50 per cent. of total removal expenses up to maximum grant of £50.

(*b*) The tenancy of a dwelling which might be bought on the open market and let at an economic rent.

(*c*) A loan under Council's Housing Mortgage scheme up to 100 per cent. of valuation.

Applications stating age, qualifications, experience, and names of two referees, should reach the City Planning Officer, 2, St. Nicholas Buildings, Newcastle upon Tyne, 1, by Monday, 13th November, 1961. 9678

COUNTY BOROUGH OF DERBY
BOROUGH ARCHITECT'S DEPARTMENT

(*a*) SENIOR ASSISTANT ARCHITECT, A.P.T. Grade IV (£1,140—£1,310 per annum). Qualifications: A.R.I.B.A.

(*b*) ARCHITECTURAL ASSISTANT, A.P.T. Grade I/II (£645—£960 per annum). Qualifications: Intermediate R.I.B.A.

(*c*) SENIOR QUANTITY SURVEYOR, A.P.T. Grade IV (£1,140—£1,310 per annum). Qualifications: A.R.I.C.S. or equivalent.

(*d*) ASSISTANT QUANTITY SURVEYOR, A.P.T. Grade I/II (£645—£960 per annum). Qualifications: Intermediate R.I.C.S. or equivalent with good experience in working up Bills of Quantities and Final Accounts, measuring on site and taking off for small works.

Commencing salary according to qualifications and experience. Permanent superannuable appointments, subject to one month's notice and to medical examination. National Conditions of Service.

Forms of application obtainable from and to be returned to the Borough Architect, The Council House, Corporation Street, Derby, not later than Monday, 6th November, 1961.

N. S. FISHER,
Town Clerk.

12th October, 1961. 9765

Competition

36s. per inch; each additional line 3s.

THE UNIVERSITY OF LIVERPOOL

OPEN COMPETITION

Architects are invited to submit designs for halls of residence for 1,100 to 1,200 students on the Carnatic site at Mossley Hill, Liverpool. The cost of the works will be approximately £1,500,000.

Assessors: Sir James Mountford, M.A., D.Litt., D.C.L., LL.D. (Vice-Chancellor).

Donald Gibson, C.B.E., M.A., D.C.L., F.R.I.B.A., M.T.P.I.

Professor Myles Wright, M.A., F.R.I.B.A., M.T.P.I.

Premiums: £5,000; £3,000; £1,000. Further premiums, to a total not exceeding £2,000, may be awarded at the discretion of the Assessors for other designs of merit.

Sending in Day: 4 September, 1962.

Last Day for Questions: 1 January, 1962.

Conditions may be obtained, upon payment of a deposit of £3, from The Registrar, The University of Liverpool, Liverpool, 3. Quoting Reference RVCH/518/AJ. 9547

Architectural Appointments Vacant

3s. per line; minimum 12s. Box Number, including forwarding replies, 2s. extra

CITY Architects urgently require SENIOR ASSISTANTS. Long term projects of contemporary design. Assistants would be in charge of projects to completion. Five-day week. Salary up to £1,750 per annum plus Luncheon Vouchers. Box S9466.

ARCHITECTS in Private Practice in London will pay £1,000 to £2,000 per annum to competent ARCHITECTURAL ASSISTANTS. Varied and interesting work in hand. Write stating age and experience and salary required to Box 9739.

£1,000 / £2,000 p.a. will be paid to experienced competent ARCHITECTS by a private practice in the City of London. The work will be primarily on the drawing board on new and interesting projects of magnitude. A high standard of design and detailing ability is required. Please apply in writing to Box TC9360.

A FEW vacancies still left for experienced and confident ARCHITECTS to fill positions of responsibility in a growing and varied practice with industrial and commercial work throughout the southern half of the country. Applicants must have initiative as well as architectural ability to carry through contracts up to £100,000, working directly with Principals but with minimum supervision. Apply in writing to Thomas Mitchell & Partners, 20 Bedford Square, London, W.C.1. TC7443

F. W. WOOLWORTH & CO. LTD.

KENSINGTON OFFICE—ARCHITECTS' DEPT.

ARCHITECTURAL ASSISTANTS required:

Five-day week, Superannuation Scheme, Dining facilities. Progressive salaries according to experience and qualifications.

Apply giving details of age and experience, and salary required, to:—

Staff Architect, 26/40 Kensington High Street, London, W.8. 9749

LONDON

EXCEPTIONAL OPPORTUNITY OCCURS for an experienced ARCHITECT to join an Architect's Organisation, to carry out a wide variety of work for which there are good prospects.

A realistic salary will be considered and a suitable applicant will be invited into association with the principals.

Please write giving full particulars to:
W. Fowler Howitt, Dip.Arch., A.R.I.B.A.
Box 9746.

A NEW POST

AN ARCHITECT is required to develop a new department in the office of Yorke, Rosenberg & Mardall, to select, classify and advise on technical data and design information and to run the photograph and reference library.

Reply to Yorke, Rosenberg & Mardall, 2, Hyde Park Place, London, W.2. 9753

DAVID STOKES & PARTNERS require a SENIOR ASSISTANT, starting salary £1,400. 5, Cochrane Street, N.W.8. PRImrose 8891. 9709

DYNELEY LUKER & MOORE require ARCHITECTURAL ASSISTANTS of Intermediate or Final standard. Good salary; five-day week; small congenial office; luncheon vouchers. Apply to 43, Welbeck Street, W.1. Telephone WELbeck 0657. TC9708

LANCHESTER & LODGE urgently require ARCHITECTURAL ASSISTANTS of all grades. Work includes hospitals, laboratories, universities, offices, housing, etc. Write full particulars or ring for interview: 10, Woburn Square, W.C.1. MUS 0845-6-7. TC7248

GLASGOW: ASSISTANT ARCHITECTS (qualified) urgently required to work either in Glasgow office or Falkirk office, on varied large scale projects. Five-day week, and non-contributory Pension Scheme. Write or telephone to Baron Bercott & Associates, 118, Blythswood Street, Glasgow, C.2. (CENtral 6556/7.) S9579

PROGRESSIVE expanding office in S.W.1 requires ASSISTANTS with ability in creative design and construction to work on competitions, and projects ranging from individual houses to central redevelopments. Salary according to ability. H. Owen Luder, 79, Regency Street. VIC 2171. S9754

A. M. GEAR & ASSOCIATES have vacancies for STAFF interested in (*a*) Research and Development; (*b*) a variety of Building Projects, Factories, Laboratories, Office Blocks and Educational. Please write giving details of training and experience to 12, Manchester Square, London, W.1. S9577

ARCHITECTURAL ASSISTANTS

INTERMEDIATE or Final standard, also DRAUGHTSMEN required in London for varied and interesting work. Salary up to £1,300 according to experience and ability. Five-day week, luncheon vouchers. Box 9718.

ARCHITECTURAL ASSISTANTS

ARCHITECTURAL ASSISTANTS required immediately for interesting general practice: Commercial and Technical College buildings: opportunities of working through projects from sketch plan stage to final accounts. Salaries within the range of £600 to £900 with annual bonus and advancement when qualified; five-day week. Apply in writing to Scott & Barlow, 10 Gray's Inn Square, W.C.1. 9719

DOLCIS LIMITED, Architect's Department requires urgently SENIOR and JUNIOR ASSISTANTS to work on their extensive programme of new and modernised shops throughout the country. Interesting and varied work. Five-day week. Staff canteen. Non-contributory pension scheme. Apply in writing giving full particulars of experience to: Ellis E. Somake, F.R.I.B.A., Chief Architect, Dolcis Limited, Architect's Department, 7-13, Great Dover Street, London, S.E.1. S9563

ARCHITECTS' ASSISTANT required. Intermediate standard or above. Interesting work. Apply G. Forsyth Lawson & Partners, 30, Horse Fair, Banbury, Oxon. S9744

ARCHITECTURAL ASSISTANT required by small, busy office in Kensington. Salary by arrangement. Mayell Hart & Partners, 118, Cromwell Road, S.W.7. FRE 8596. 9734

WEST RIDING ARCHITECTS require SENIOR and INTERMEDIATE ASSISTANTS for progressive posts in varied practice. Experience on Banks and Supermarkets an advantage. State experience and terms to Joseph Berry & Sons, F/A.A.R.I.B.A., 5, Market Walk, Huddersfield. 9733

ARCHITECT with 2-3 years' experience needed in congenial Kensington office. Salary in accordance with responsibility undertaken. Very varied work. Apply Chapman, Taylor, Partners, WESTern 6611. 9741

ASSISTANTS required of inter. standard in busy, small practice. Experience necessary in flats, houses and shops. Good draughtsmanship essential. Salary by arrangement according to qualifications and experience. R. Jelinek-Karl, F.R.I.B.A., 6, Buckingham Street, Strand, W.C.2. S9740

SEVENOAKS AREA. ASSISTANT with at least three years' experience urgently required in small office with the most beautiful view in Kent: the work is varied and interesting modern architecture, and a reasonable salary will be paid. Herbert Morel & Associates, F/A.R.I.B.A., Toys Hill, Westerham, Kent. Telephone: IDE HILL 387. 9737

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who are interested in the DESIGN, RESEARCH and DEVELOPMENT of Multi-storey projects and Contemporary Housing schemes, are urgently required by this progressive company.

SALARIES UP TO £1,650
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Apply in confidence to Chief Architect,
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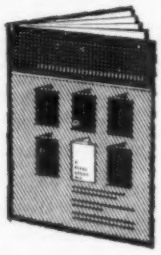

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We have vacancies in the Architects' Department in LONDON & EPSOM for qualified men and those who have passed the Intermediate R. I. B. A. Examination.

These are permanent positions:

Luncheon vouchers, five day week, pension scheme.

Please write fully in confidence to the

Personnel Manager,
W. S. Atkins & Partners,
158 Victoria Street,
London, S.W.1.

CORPORATION OF LONDON

The City Planning Department has interesting Planning projects on hand and others in active preparation, e.g. large scale development is now proceeding in Barbican Commercial zone where separated pedestrian walkways are planned for a large area.

A vacancy exists in the Civic Design Section for a QUALIFIED ARCHITECTURAL OR PLANNING ASSISTANT. Salary Scale £990-£1,310 to join a small group working on the present important phase of replanning the City. Opportunities for advancement should occur from time to time.

Local Act Superannuation.

Apply to:
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£1,600 - £1,450-£1,000 ARCHITECTS and ASSISTANTS required in these grades by London private practice. Interesting work on jobs of all sizes and types, with opportunity to work with specialist groups on large projects. Non-contributory pension and Insurance scheme, and excellent new offices. J. G. L. Poulson, 15, Greycoat Place, S.W.1. Telephone: SULLIVAN 6308. 9736

SENIOR ASSISTANT required for small practice in London. Applicants should have real ability for design work, particularly in the residential development field. The work is varied and there is a first class opportunity for someone of the right calibre. Salary range £1,300 to £1,500. Telephone Alan S. Raimes and Associates —CITy 4201. S9735

£850-£1,600. ARCHITECTURAL ASSISTANTS required. Long term prospects. Non-contributory pension and life assurance schemes. Five-day week. Telephone or write: Ronald Ward & Partners, 29, Chesham Place, Belgrave Square, S.W.1. Belgravia 3361. TC6105

ARCHITECTS' ASSISTANT required, up to Intermediate standard, to work on large and interesting projects. Salary within range £600—£800. Applicants must be good draughtsmen, with sound knowledge of detailing. Please write giving full particulars of experience, age, etc., to: F. W. Beech & R. Curnow Cooke, F./L.R.I.B.A., 15, Dix's Field, Exeter. TC9706

ARCHITECTURAL ASSISTANTS of all grades, particularly Intermediate standard, required on varied and interesting projects. High salaries will be paid in accordance with skill or experience of applicant. Lewis Solomon, Kaye & Partners. City 8811. TC5970

SOUTHAMPTON. ASSISTANT of at least Intermediate standard required to help with projects in Hampshire and the Isle of Wight. Apply to E. M. Galloway & Partners, F./A.R.I.B.A., 10 Portland Street, Southampton. TC9098

ARCHITECTURAL ASSISTANTS required in Busy Bloomsbury office with varied practice. Good salary and prospects for suitable applicants. Five-day week. Write giving particulars of age, qualifications, experience, etc., to Box 918, c/o 7, Coptic Street, W.C.1. TC5647

SENIOR ARCHITECTURAL ASSISTANTS. Large Office has a limited number of vacancies for Senior Architectural Assistants, salary range £900—£1,500, to undertake work of a varied and interesting character.
Reply with particulars of experience to Box TC6875.

ROBERT MATTHEW & JOHNSON-MARSHALL have vacancies in their London office for ARCHITECTS at all levels of experience for a variety of interesting jobs. Apply to Robert Matthew & Johnson-Marshall, 24, Park Square East, N.W.1. TC6547

ERIC FIRMIN & PARTNERS require ASSISTANT of Intermediate or Final standard preferably with previous office experience for interesting variety of projects. Five-day week, Luncheon Vouchers, holiday arrangements respected. Salary by arrangement according to qualifications and experience. Write to Thavies Inn House, Holborn Circus, E.C.1, or 'phone CITy 8811. TC8904

CITY Architects urgently require JUNIOR ASSISTANTS experienced in detailing and capable of assisting in design. Long term projects. Five-day week. Salary up to £1,250 per annum plus Luncheon Vouchers. Box 9467.

SENIOR and JUNIOR ASSISTANT ARCHITECTS required with progressive outlook, for work on a wide range of projects. Starting salaries up to £900 for Intermediate standard and up to £1,250 for Final standard, according to experience. Five-day week. Box TC9219.

ELIE MAYORCAS requires ARCHITECTURAL ASSISTANTS with a minimum of three years' office experience in this country. Write, giving brief particulars of architectural education and experience, to: 13, David Mews, Baker Street, W.1. TC9442

EXPERIENCED ASSISTANT ARCHITECT required in West End office. Varied work, must be a competent designer and administrator. Opportunity for advancement to position of responsibility. Starting salary up to £1,250 according to experience. Luncheon vouchers. Five-day week. Box TC9218.

EXPERIENCED ASSISTANT, not necessarily qualified, required for small progressive office in Hammersmith. Salary by arrangement. Ring RIV 8021 or write Norman Starrett, 269, King Street, W.6. S9521

CLIFFORD CULPIN AND PARTNERS need additional staff in their London and Hemel Hempstead offices. Men of about Intermediate standard particularly required to join small teams of keen men on important, varied projects. All must have a sound sense of modern design. 39, Doughty Street, London, W.C.1. CHAncery 5395. TC9379

ASSISTANT required for varied practice—Finals standard. Apply: Barber, Bundy & Greenfield, 19, Quarry Street, Guildford. TC9677

SMALL PROGRESSIVE AND CONTEMPORARY LONDON OFFICE REQUIRES ASSISTANTS. GOOD OPPORTUNITY FOR PEOPLE WISHING TO GAIN EXPERIENCE IN ALL ASPECTS OF A VARIED PRACTICE. BOX S9447.

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REQUIRE in their London Office
Junior Assistants with two or three years' experience.
Salary £500/£700 per annum.
Intermediate Assistants with several years experience.
Salary £1,000 per annum.
Reply to 19, Cavendish Square, London, W.1. S9526

ARCHITECTURAL ASSISTANT required for permanent position in Architect's Department of progressive East Coast Brewery Company. Sound training and experience together with an interest in interior design essential. The Company operates a Pension Scheme with substantial benefits. Five-day week. Write giving age, salary required and full details of training and experience to Box S9528.

INTERMEDIATE or SENIOR ASSISTANTS required for office with varied practice. Write W. F. Howard, F.R.I.B.A., 35 Thurloe Street, South Kensington, S.W.7. S9530

ERIC LYONS has place for experienced ASSISTANT ARCHITECT who wants responsibility and opportunities. Brief particulars to: Mill House, Bridge Road, Hampton Court, Surrey. TC9542

ARCHITECTURAL ASSISTANT. Man or Woman with some office experience required for interesting country practice. L. H. Bond and R. W. Read, 44, Castlegate, Grantham. TC8851

WELLS, HICKMAN & PARTNERS require first-rate ASSISTANTS for varied and interesting work. Salary according to ability and experience. 'Phone: TERminus 1404. 9624

OSCAR GARRY & PARTNERS require ASSISTANTS of both Intermediate and Final standard, with at least two years' office experience in this country, to work on interesting projects in early design and contract stages. Five-day week, luncheon vouchers. Salary by arrangement, according to qualifications and experience. Phone WEL 2507 or write 66, Gloucester Place, London, W.1. TC9621

ENTHUSIASTIC ASSISTANT (up to Intermediate standard) required immediately by small but busy City Architects. Phone LON 3825. S9616

INTERMEDIATE ASSISTANTS required in busy provincial office. Wide variety of work of an interesting nature. Contemporary outlook welcomed—good rates of pay in accordance with experience. Hare & Pert, A/A.R.I.B.A., 29, Elm Street, Ipswich. 9595

INTERMEDIATE TO FINAL ASSISTANTS required immediately. Salary from £1,000 onwards and luncheon vouchers. Theo. H. Birks, 38, Portland Place, London, W.1. LAN 7236. TC8906

KINGSTON-UPON-THAMES. SENIOR ASSISTANT required (male or female) for interesting and varied work. Salary up to £1,150 per annum for suitable applicant. Pleasant and congenial office conditions. Five-day week. Applications in writing only giving full particulars, Donaldson & Co., Architects, 75 London Road, Kingston-upon-Thames. TC9281

ARE you kept pinned to the Drawing Board day in day out? If so, we can offer you much greater scope in gaining all round experience and carrying through the varied duties of an ARCHITECTURAL ASSISTANT. Responsibility positively encouraged. Write telling us your experience with the usual particulars; it may well be to our mutual advantage (Box TC 9730) or Telephone MAYfair 3111.

WE have two vacancies in our rapidly expanding and long established practice, for ASSISTANTS of Intermediate standard with two or three years' experience. We can offer plenty of scope to the right applicants, and further their present experience both in the office and on the site. Please contact Box Tc9731 or Telephone MAYfair 9554.

ANDREWS EMMERSON & SHERLOCK require responsible JUNIOR and SENIOR ASSISTANTS for work on a variety of domestic and commercial projects. Salaries by arrangement. 63, Dean Street, W.1. Telephone GERrard 5721. 9727

ARCHITECTURAL ASSISTANT.
Intermediate standard—age 18-25.
Required in Westminster office—general practice—no Saturdays—Luncheon Vouchers.
Apply stating age, experience and salary required. Box 9702 or Telephone VICtoria 4806.

£750-£1,500. ARCHITECTURAL ASSISTANTS required (male or female) to work on varied and interesting projects in busy Essex office (within 10 miles of London). Five-day week and prospects of early promotion to Associate Partner. Apply Box S9701.

PERSONAL INTERMEDIATE ASSISTANT required for Architect in Holland Park Office in a private residence. Salary by arrangement. PAR. 7042. S9598

ARCHITECTURAL ASSISTANTS urgently required for work on variety of industrial buildings, offices, laboratories, canteens, etc. Five-day week. Luncheon Vouchers. Pension Scheme. Salary range £850—£1,400. Write Elliott, Cox & Partners, 172 Buckingham Palace Road, S.W.1, for interview. S9700

ASSISTANT ARCHITECTS with three to five years' experience required in London office of Peter Dickinson Associates. Wide and interesting variety of projects handled, providing scope for initiative and responsibility. Salary arranged according to ability and experience. Apply in writing giving full details of education and experience to: J. M. Hunter, Peter Dickinson Associates, 37 Gloucester Place, W.1. 9704

ARCHITECTURAL ASSISTANTS wanted in small office with varied practice. Intermediate to Final standard, with salary range of £700—£1,000 according to experience. David E. Nye & Partners, 172, Buckingham Palace Road, S.W.1. (SLO 9730.) S9759

EXPANDING practice of young architects in Thames Valley requires a "company secretary" with a good knowledge of the processes of architecture/planning to take over administration and help direction of the group. Town house available. Box 9756.

ARCHITECT at Associate level required primarily to *build*; housing available; career details.
Tom Hancock of Morton Lupton,
1 Church Lane,
Wallingford,
Berkshire. 9757

SHREWSBURY. ASSISTANT required in small busy office, to work with Principal on interesting design projects. Salary £850—£1,000 p.a. Graham F. Goatley, A.R.I.B.A., Foresters Hall, Wyle Cop, Shrewsbury. S9761

ASSISTANTS wanted to work in small office with partners. Phone or write to Bird & Tyler, 13 Welbeck Street, W.1. Welbeck 0882. 9764

IPSWICH. ARCHITECTURAL ASSISTANT of Intermediate standard urgently required for varied and interesting work. Salary according to experience etc. Shepperdson & Dixon, 2 Museum Street, Ipswich. S9768

ASSISTANT ARCHITECT required for the extensive rebuilding programme at the London Zoo. Applicants should be qualified. Commencing salary, dependent upon experience, within the scale £890 to £1,185. Non-contributory pension scheme. Good conditions of service. Apply in writing to Establishments Officer, Zoological Society of London, Regent's Park, N.W.1. 9769

ARCHITECT, experienced, school-trained Associate. Age 30/35, required for busy Manchester practice. Full details to Box S9772.

DEVON. ASSISTANT required with a good sense of contemporary design, capable of producing working drawings. Bonus system. Write stating particulars: Mervyn Seal, 6 Fore Street, Brixham, Devon. 9773

FARMER AND DARK
have some vacancies for
QUALIFIED ARCHITECTS, age 25/35,
preferably with office experience
for varied and interesting home
and overseas work. Five-day week.
Apply to Romney House, Tufton Street, S.W.1.
Tel.: ABBey 6311. S9628

BRYAN AND NORMAN WESTWOOD require a SENIOR ASSISTANT ARCHITECT; salary around £1,200. Apply to 21, Suffolk Street, S.W.1. TRAfalgar 1106. TC9630

GOTCH AND PARTNERS, Architects, require SENIOR and JUNIOR ASSISTANTS in their London, Brighton and Bristol Offices. Five-day week. Luncheon vouchers. Good salary for enthusiastic and capable men. Reply: 8, City Road, E.C.1. S9583

GLASGOW: Baron Bercott & Associates have vacancies for ARCHITECTURAL ASSISTANTS (Intermediate to Final standard) to work on varied large-scale projects. Opportunity to work either in the Glasgow office or Falkirk office. Non-contributory Pension Scheme, five-day week. Write or telephone to Baron Bercott & Associates, 118, Blythswood Street, Glasgow, C.2. (CENtral 6556/7.) S9578

ARCHITECTURAL ASSISTANT with good experience required by a busy general practice with a wide scope and good prospects. Independence and initiative are encouraged and salaries will be arranged accordingly. Applications in writing should give details of education, experience, accompanied by copies of two references. Box 9747.

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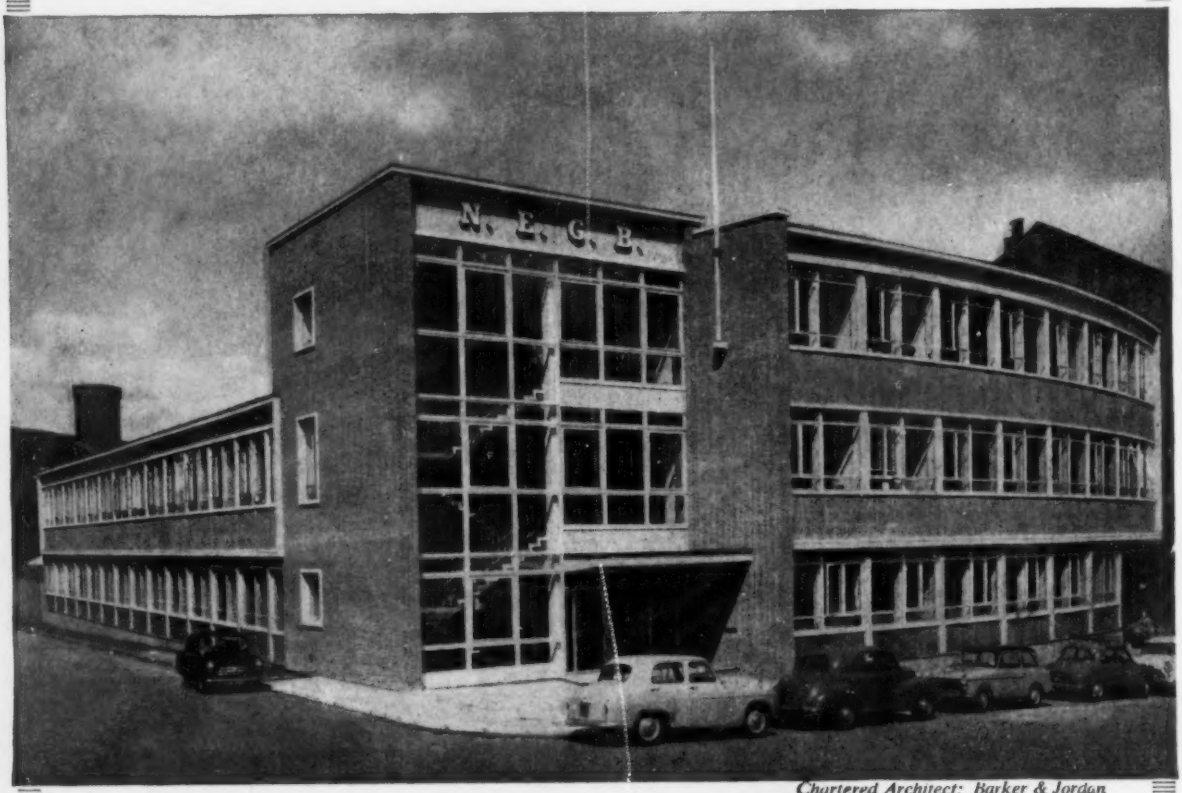

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