The Architects' Journal
November 8 1961 Vol 134 No 19 Price 1s

SfB (16)-(19)

This issue of the AJ should be filed as it contains part of a 50-part technical information library which the AJ is founding. Below are the most important elements from Table 1 of the SfB classification.

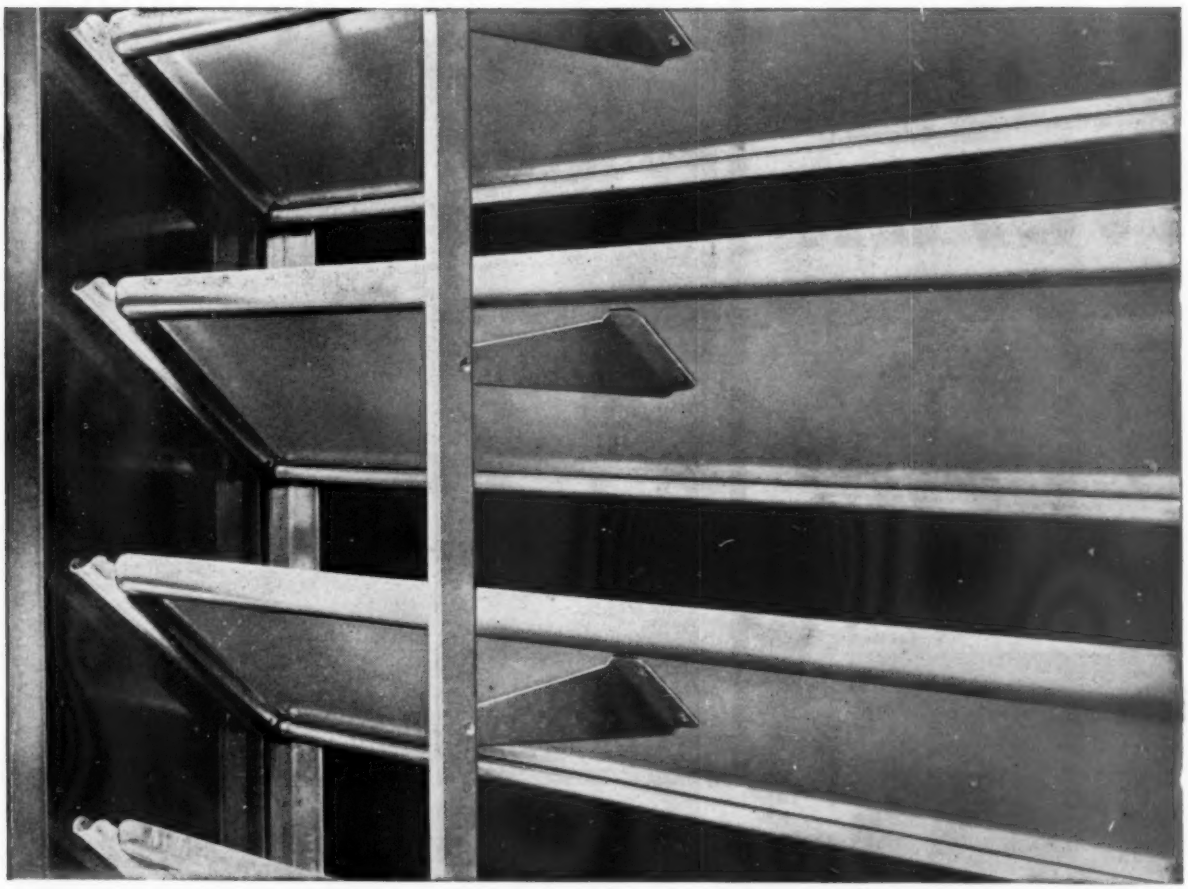
These are the key to our library production programme, and each week we shall publish, with the normal AJ, a supplement dealing with one of these elements. Headings in bold type are those dealt with in previous issues. This week's supplement covers SfB (16) to (19). The remaining headings will be published 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 and forming 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)-(19)
Foundations

(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) Rocoms, 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

There it is—in every COLT ventilator



Look carefully at the rain channels on a Colt Ventilator, at the nylon bearings, at the flanges. And you'll see it —Colt experience, that attention to detail which is vital in a ventilator and a ventilation system. Colt pay attention to detail. They have to, because they tackle ventilation on a very broad front.

At Shell Laboratories, Egham, for example a system of Colt CO Ventilators, mounted in the glazing, provides general ventilation combined with automatic fire ventilation.

In every branch of British industry there are Colt-designed ventilation systems, based on the knowledge gained from thousands of site surveys and installations. Many of the systems, complete with controls, were not only designed by Colt, using equipment of Colt manufacture, but were installed by them, too. This is what Colt mean by a complete ventilation service.

Ask your Secretary to write to the Information Officer for the free Colt Manual of Service and Equipment.

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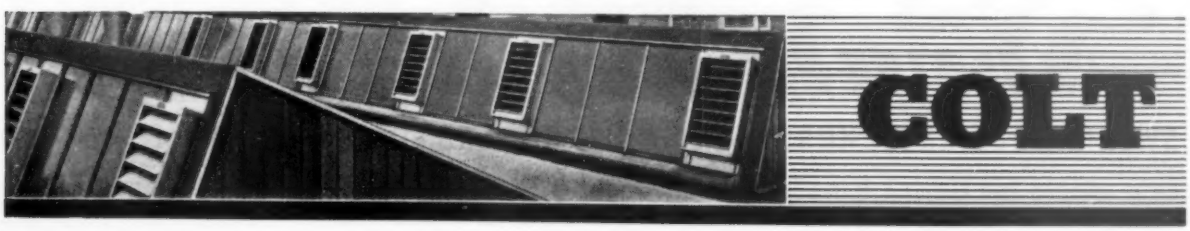
Messrs. Walker, Harwood and Cranswick.

CLIENT
Shell Petroleum Limited. Continuous Combustion Laboratories Egham, Surrey.

CONTRACTOR
Trollope and Colls Limited.

VENTILATION
An installation of 51 cable operated, Dual Purpose Ventilators. Colt Ventilation Ltd Surbiton Surrey. Telephone: ELMbridge 0161



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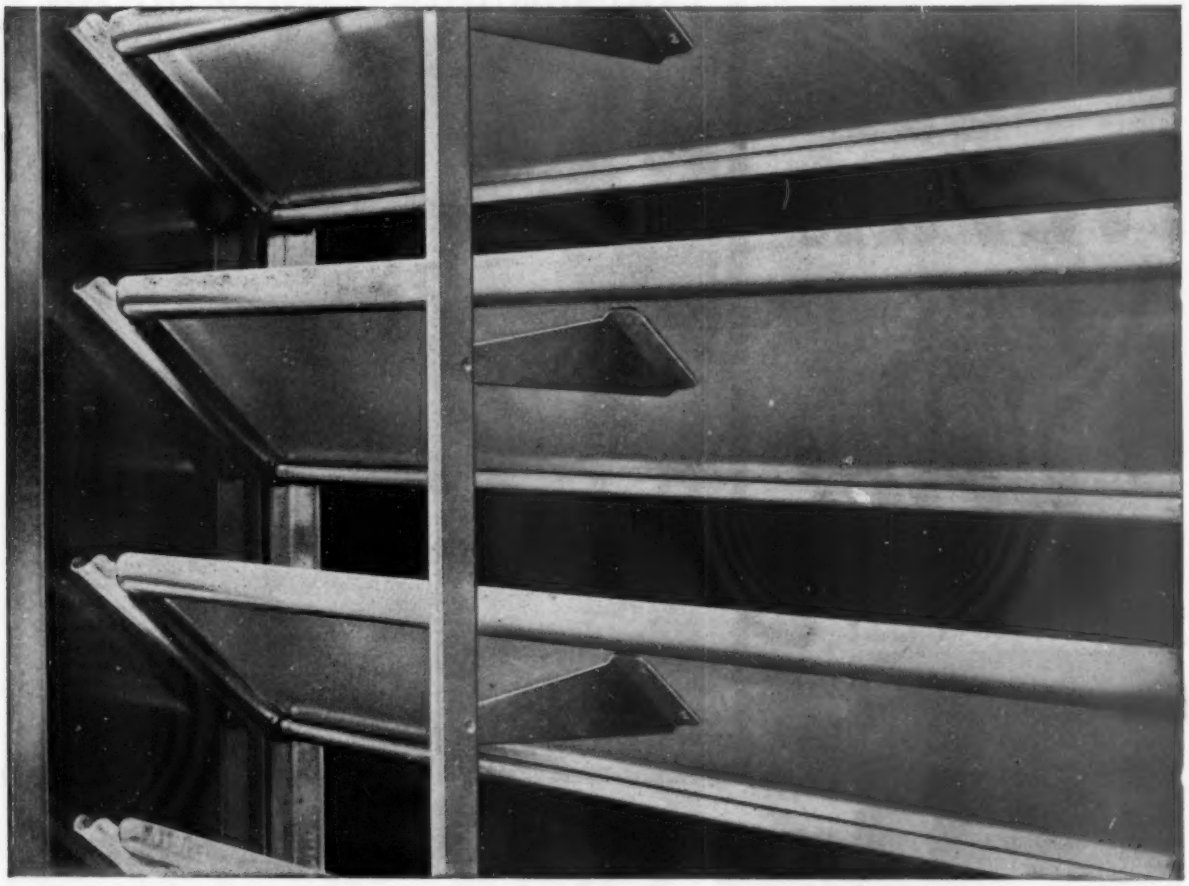

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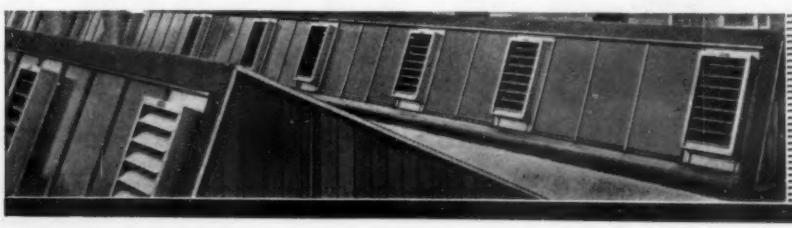

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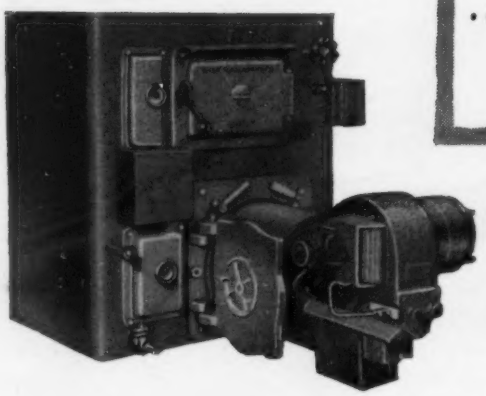

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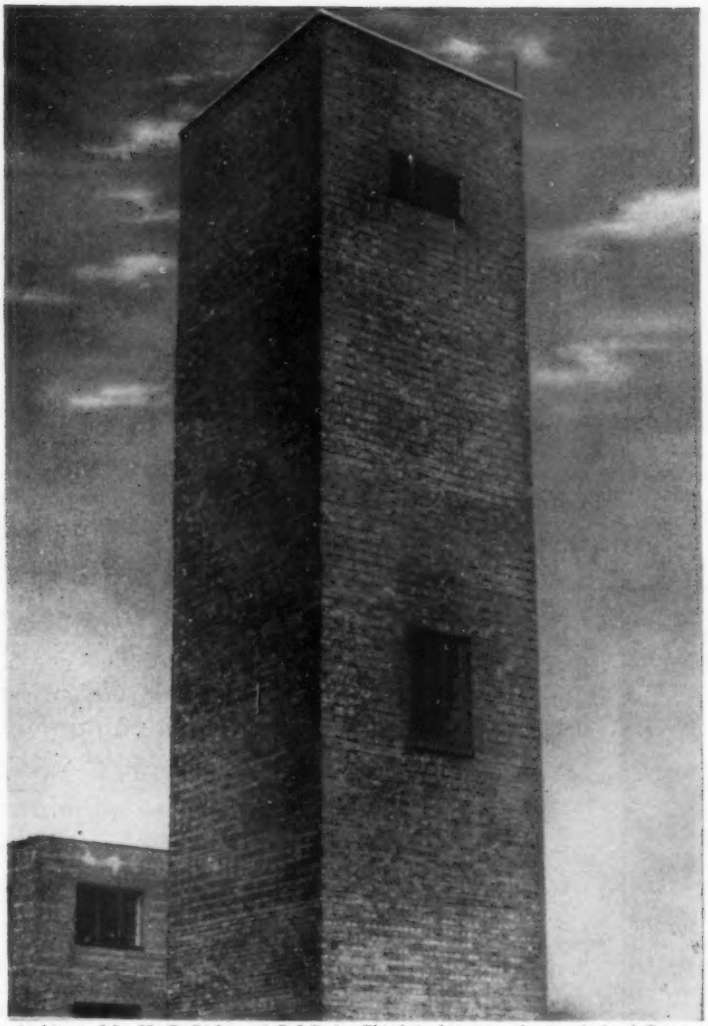

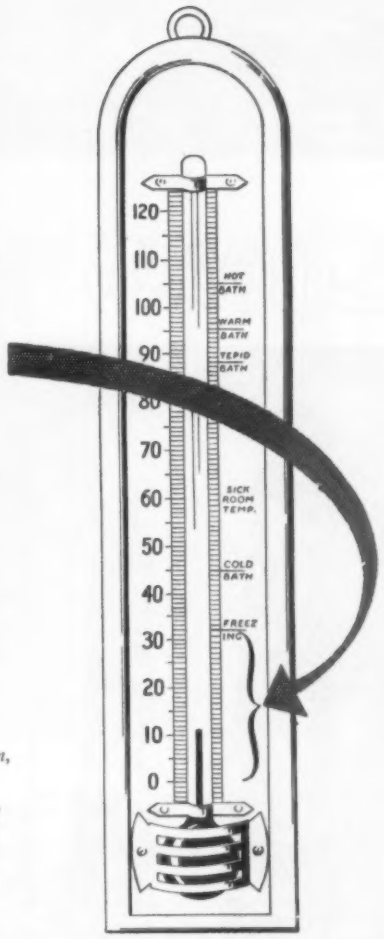

Architect: Mr. H. C. Bishop, A.R.I.B.A., Chief Architect to the Sunderland Corporation, Contractors: Messrs. R. Mathews Ltd., 25, Villiers Street, Sunderland.
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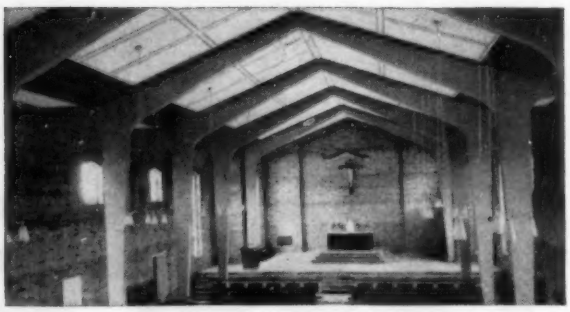

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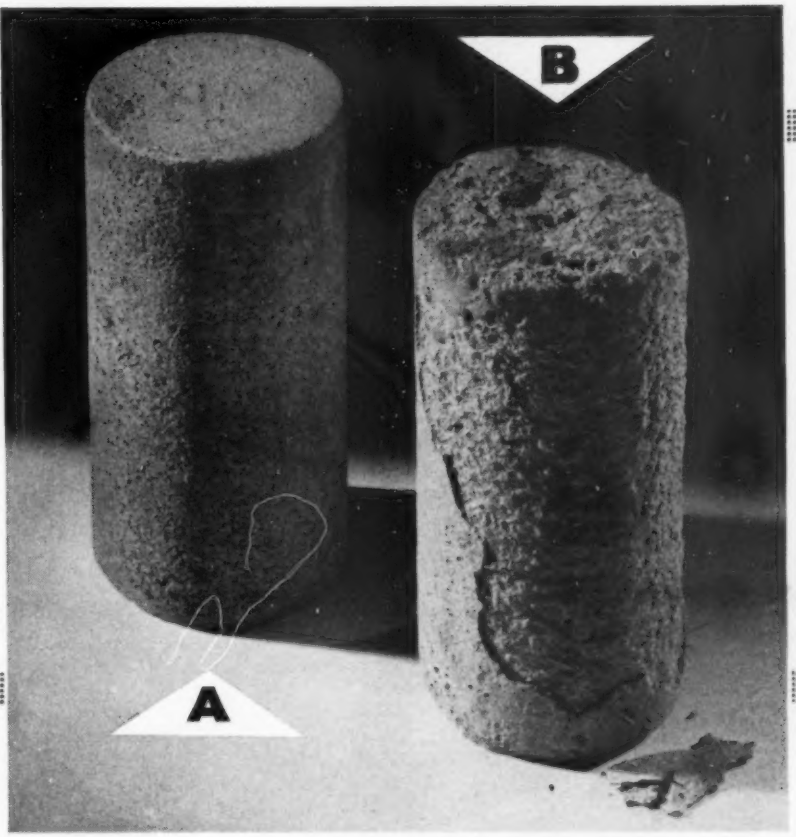

COMPOSITION OF MORTAR *CYLINDER MARKED*

B

1 part cement
1 part lime
6 parts sand
BY VOLUME

To compare the durability of mortar containing FEBMIX ADMIX Mortar Plasticiser and ordinary cement, lime and sand mortar cylinders of each were made, allowed to cure for one month and were then subjected to 30 cycles of freezing and thawing when the above photograph was taken.

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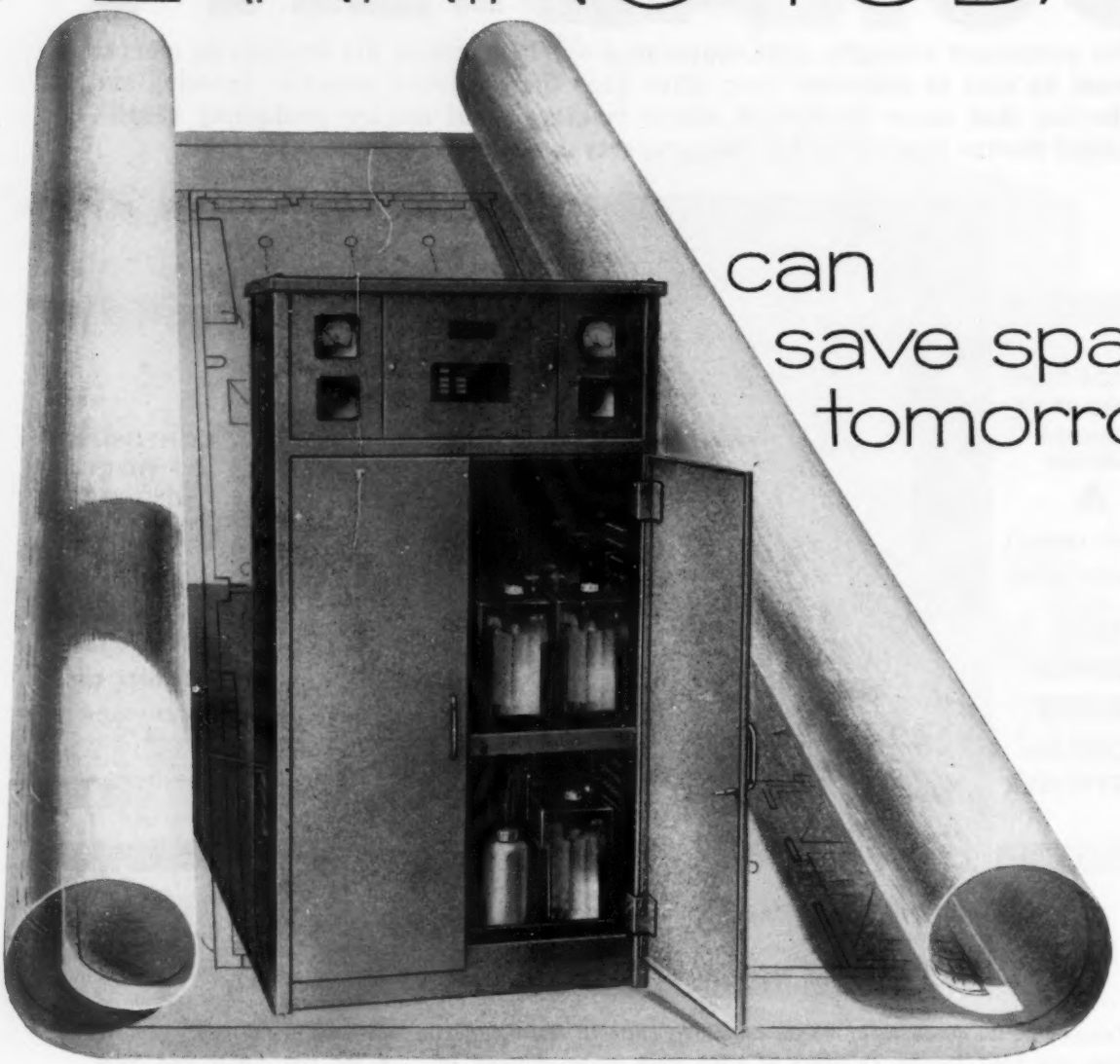

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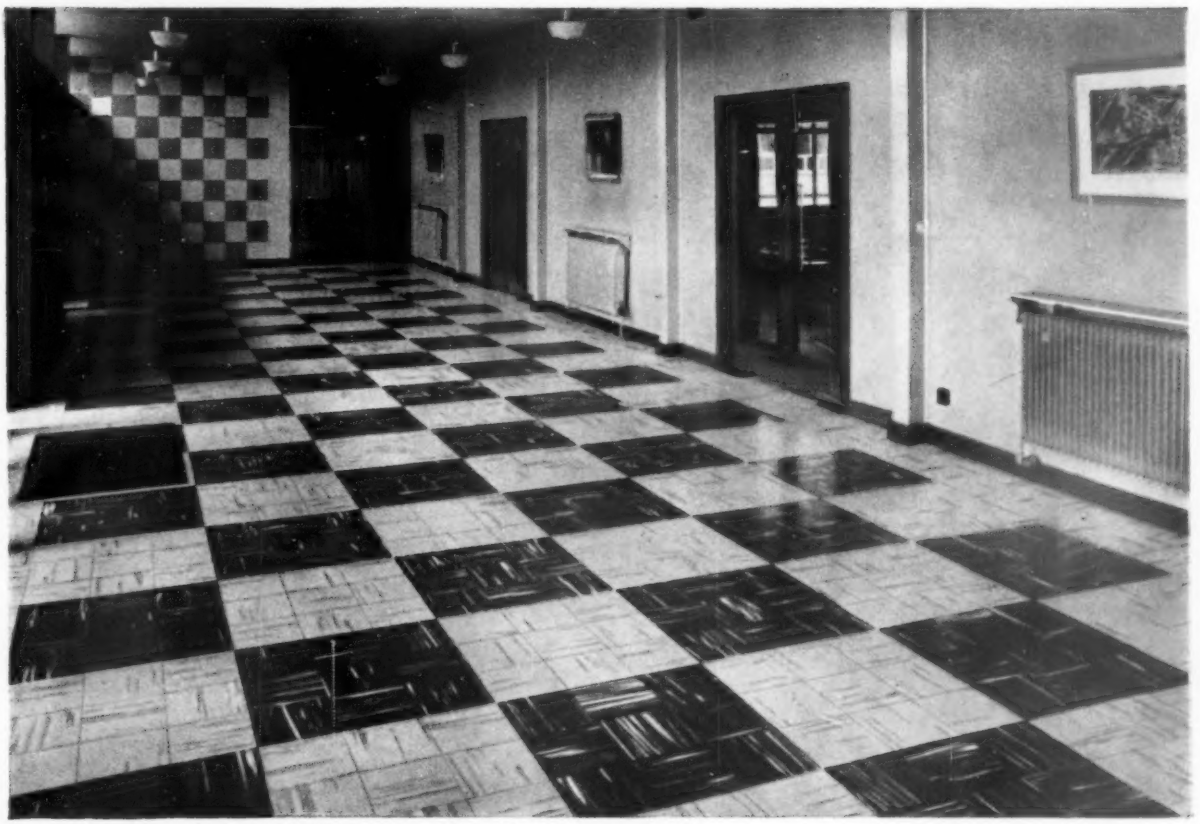

Accoflex in the main corridor of the Hagley Park County Secondary Modern School, Rugeley, Staffs.

The main corridor of a busy school takes almost as much foot-pounding per square inch as a main highway. Obviously the floor has to be tough; but it also has to be attractive enough to entice scholars in as well as speed them out. Colourful, hard-wearing, grease-resisting Accoflex takes their comings and goings in its stride.

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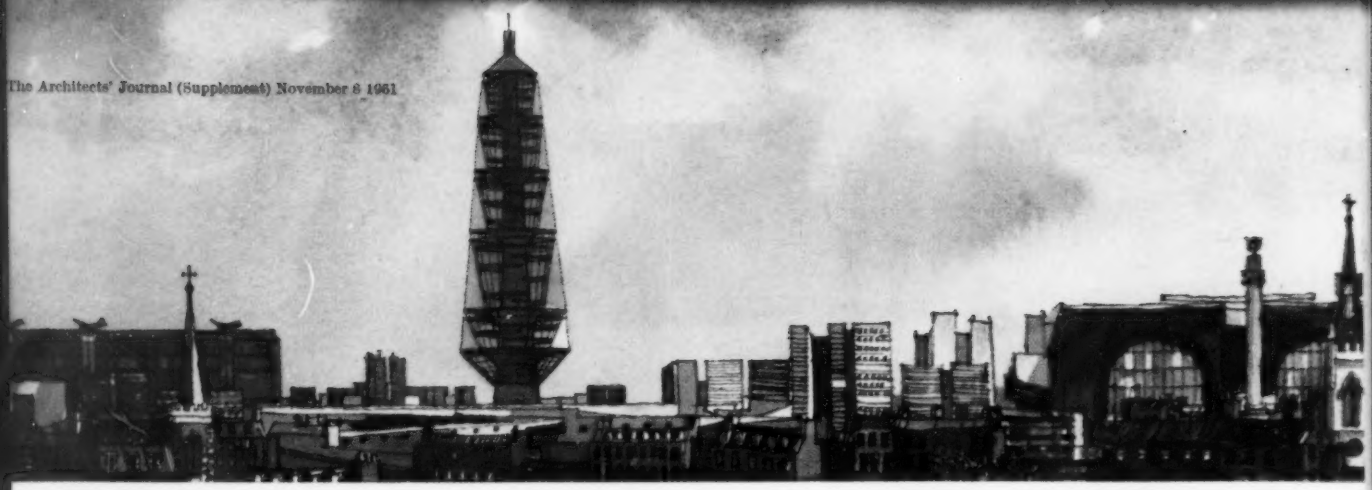
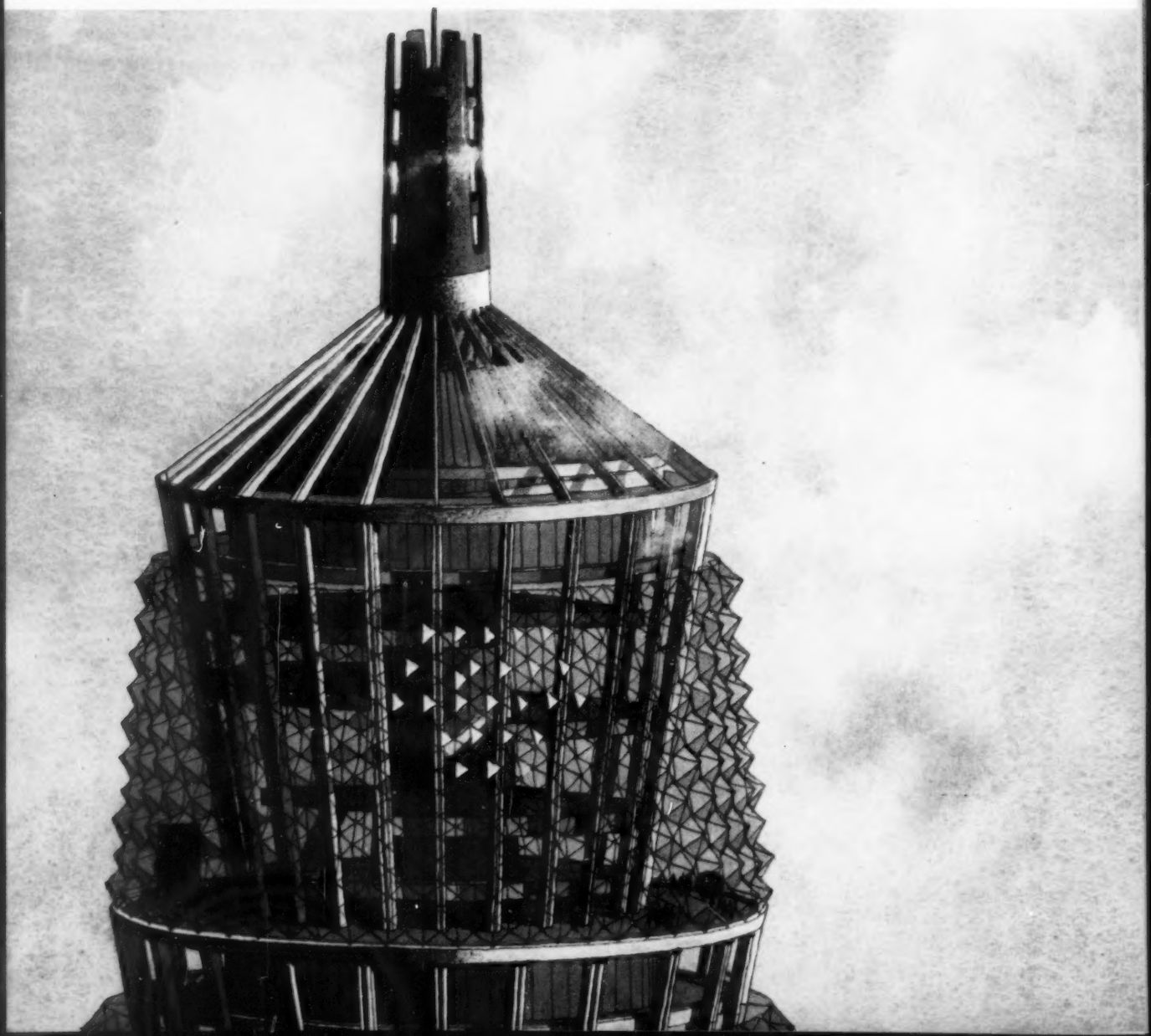
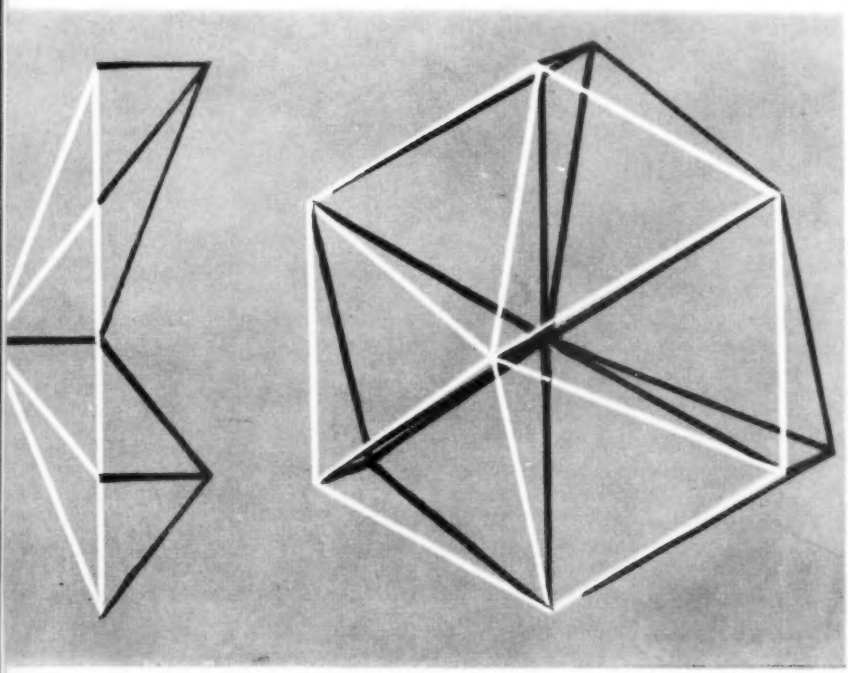


Crystal 61



A view of one of the exhibition halls showing the effect of the faceted glazing.

The Glazing



In erection, the triangular units would be accurately welded up on jigs on the ground, and then assembled in position. The glazing technique would use neoprene compression glazing strips—of the type used for car windows—to fix the glass.

Crystal 61 is completely enveloped in glass which covers and protects the tubular steel space-frame supporting it. This space-frame carries the glazing in a clear span from the top to the bottom of each 'hall', a vertical distance of up to 176 feet. It is made up of braced hexagons, each consisting of three triangular units. The centre of each hexagon projects outwards, and alternate corners project inwards. The glass which covers it therefore has an interesting faceted surface.

From a distance the building will be completely translucent, and the main structure will show in silhouette. From within, a panorama of London is disclosed in every direction beyond the outer skin of the building.

Crystal 61 is a design for an exhibition building with 550,000 square feet of display space in five tiered halls, capable of accommodating 100,000 visitors a day. By soaring 1,000 feet out of its surroundings it would provide its own advertisement. Crystal 61 was conceived by Mr. Ove Arup and Mr. G. A. Jellicoe, with John Martin of Ove Arup and Partners, Civil Engineers, and Hal Moggridge of Jellicoe, Ballantyne and Coleridge F/A.R.I.B.A. under the auspices of the Glass Age Development Committee, which is convened by Pilkington Brothers Limited and consists of Mr. G. A. Jellicoe C.B.E. F.R.I.B.A., Mr. Edward D. Mills, C.B.E., F.R.I.B.A. and Mr. Ove Arup, C.B.E., M.I.C.E.

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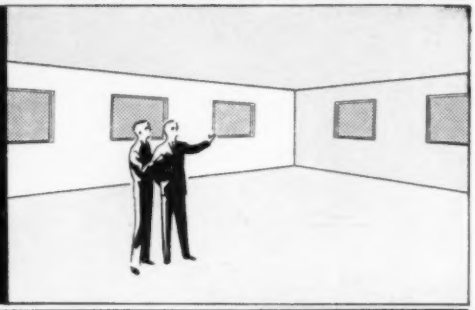

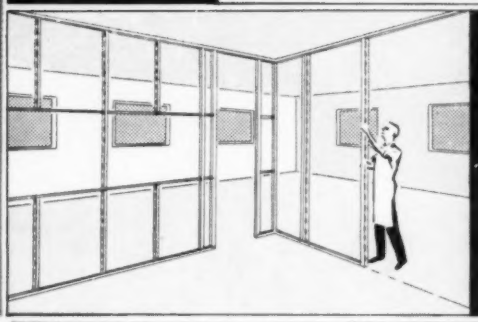

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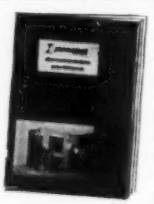

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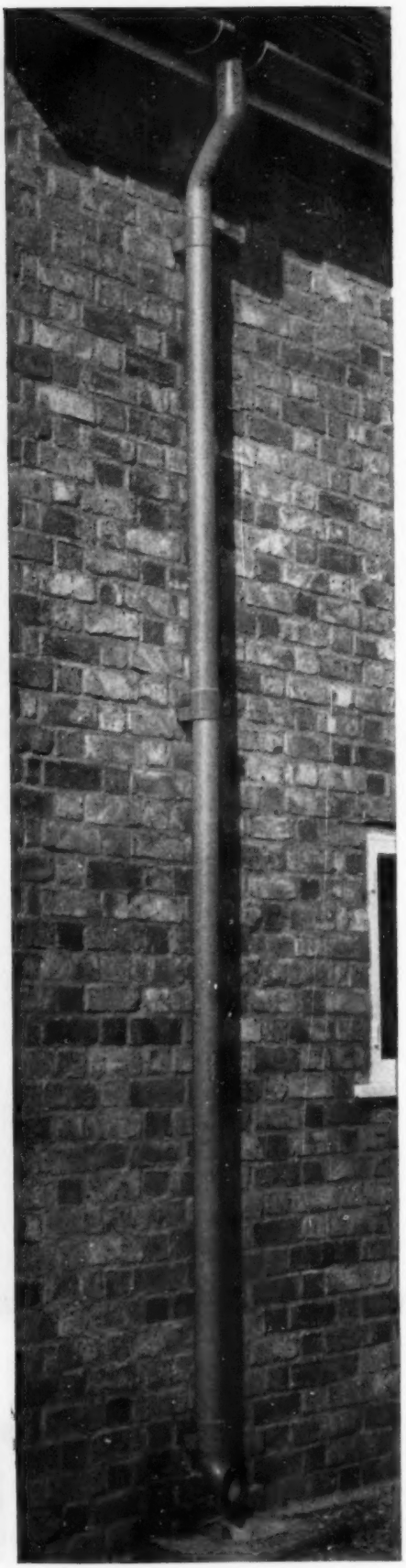

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St. Alphage House, Barbican Redevelopment.

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Spray treatment of a Holoplast aluminium curtain wall unit on site before fixing in St. Alphage House.

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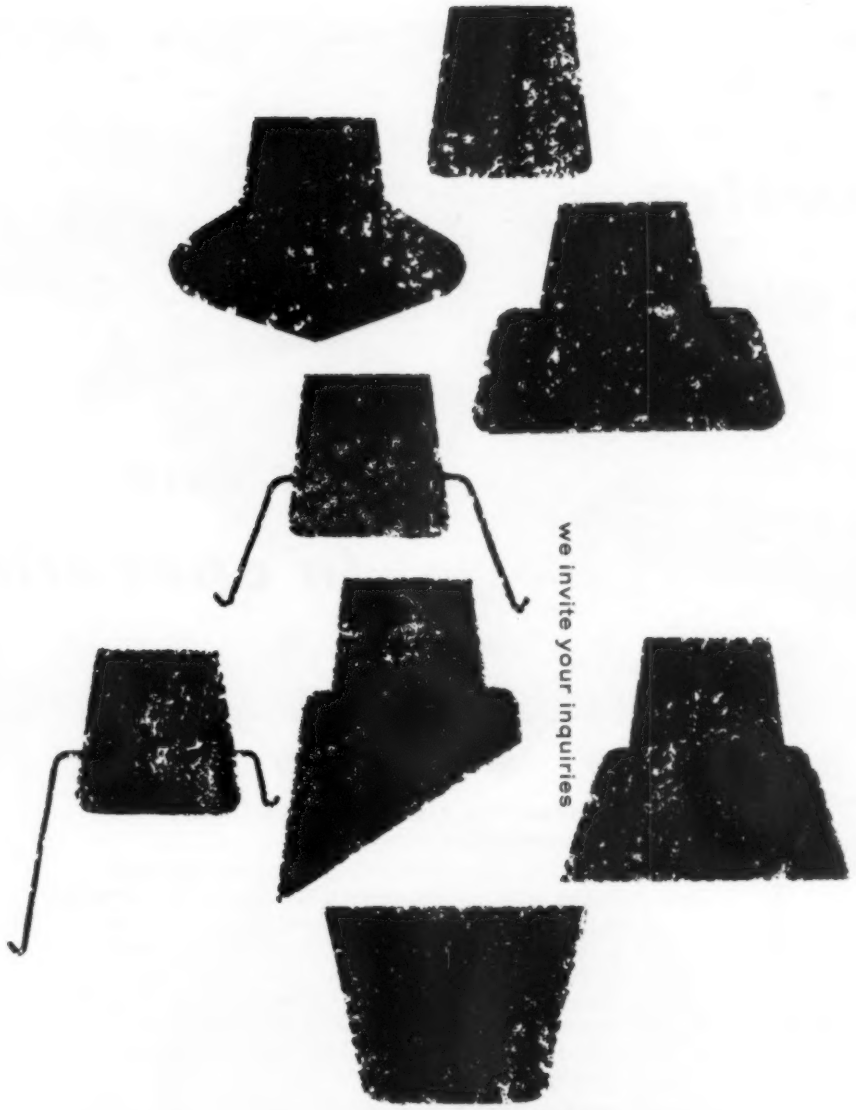

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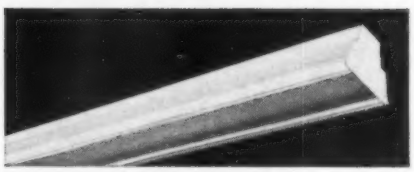
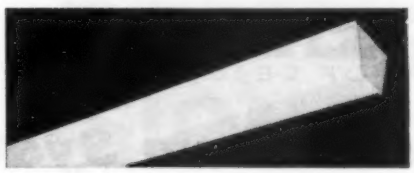


SPERRIN



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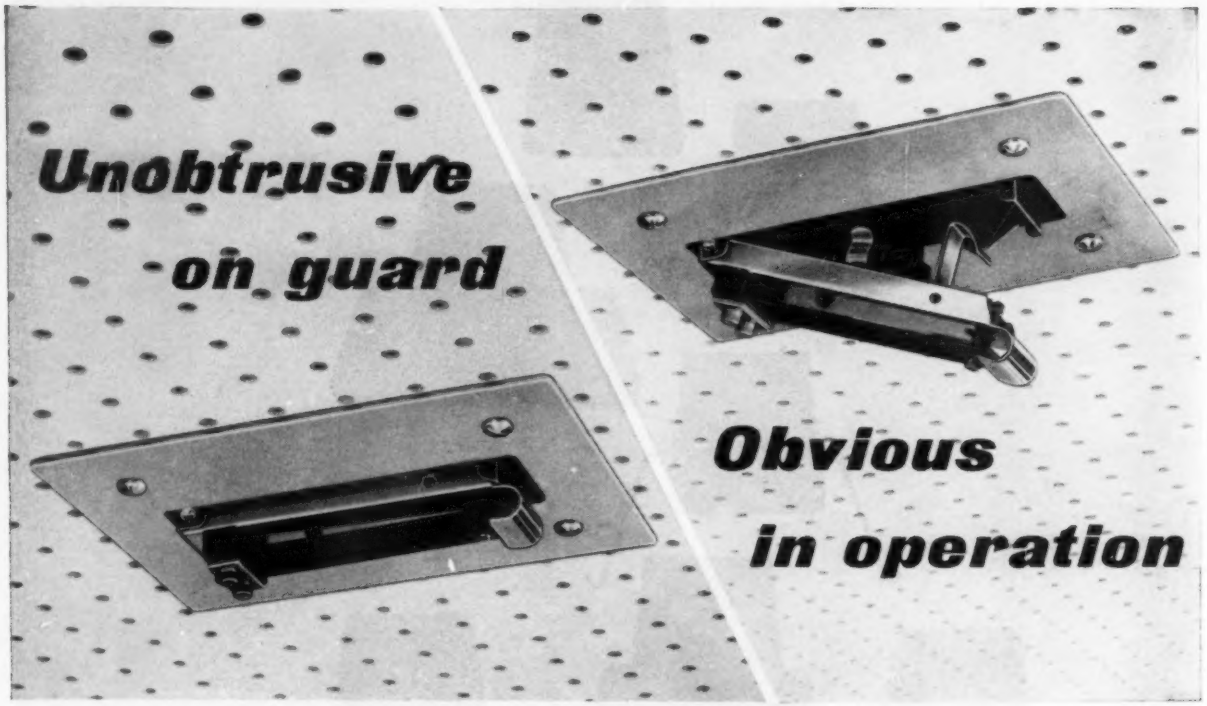
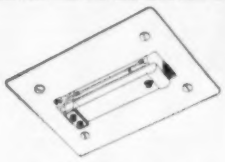
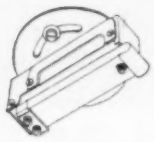




Gents Automatic Fire Detector
— flush fixing model



Gents Automatic Fire Detector
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In any Automatic Fire Alarm System the Detectors are the nerve centres of the installation.

When the temperature becomes dangerously high even without a fire breaking out, down tilts a Gent's Fire Detector to sound the alarm and you know where to look for the cause — because you can see which one has operated instantly. This is but one of the many important features of Gent's Automatic Fire Detectors — they are made to such a high standard and are so sensitive to temperature changes that they carry the Kite Mark (complying with British Standard 3116).

Everything depends on them being ready for instant action no matter how long they have been installed. That's why Gent's Detectors are being installed so extensively — they are the first ones to carry the Kite Mark.

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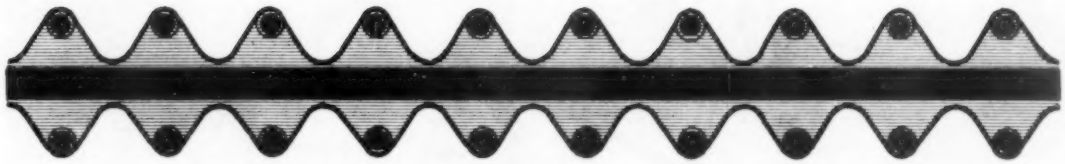

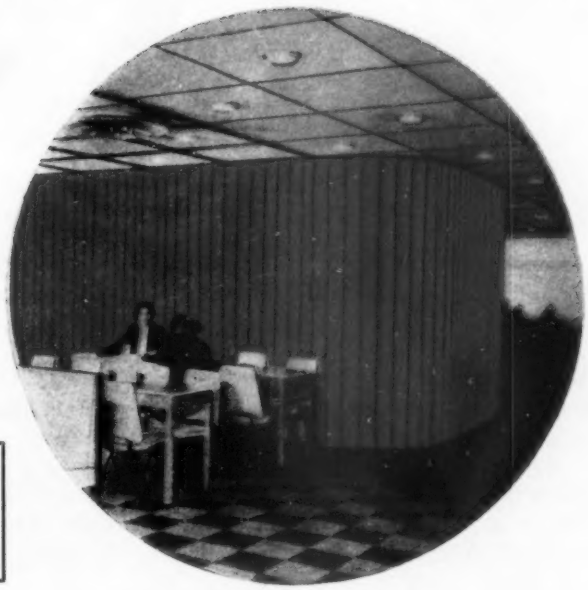

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Courage, Sir Henry. Do not allow yourself to imagine it is the lull before the storm.

Dashed tricky business—increasing an overdraft . . .

All of us are inclined to be aware of an 'awesome hush' as we approach the Bank Manager's sanctum. But, on this occasion, there is another reason.

There is? Speak then, man . . .

The reason is above you, Sir Henry. Cullum Acoustic Tiles. Recently installed here . . . as in so many other buildings where *unwanted* noise must be kept to a minimum. Where sound must be controlled, and nerves kept cool and steady.

Cullum, eh. They are indeed performing a notable service. Lead on, Fortescue . . . any man who works in this haven of peace and quiet must be in a relaxed and friendly state of mind!

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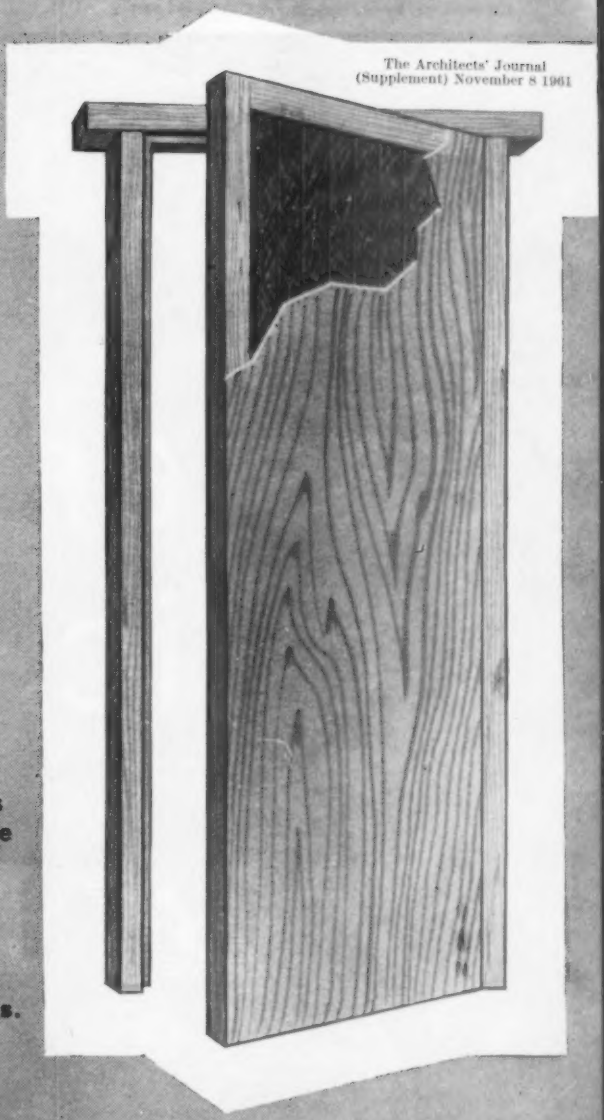

It is agreed everywhere that tomorrow's buildings must be protected against fire. How best to achieve this? The use of factory-hung Lindoco Fire-Check doorways is an obvious starting point. These craftsmen-built doors have a core of solid Stramit which defies fire vigorously. They are available, complete with frames, in two types, Half-Hour and One-Hour. Please write to us for further details.

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Lindoco patent factory-hung doorways are highly-efficient fire-barriers which fulfil all Fire-Check requirements as laid down by B.S. 476—1932 and BSS.459, Part III, 1946. Tests by the Department of Scientific and Industrial Research and Fire Offices Committee Joint Research Organisation indicate that the "half-hour type" door also passed for the GRADE "E" fire-resistance.

National Physical Laboratory tests show that the Lindoco Fire-Check door, with its core of solid Stramit, provides better insulation against airborne sound than a solid timber door. Official test report forwarded on request.

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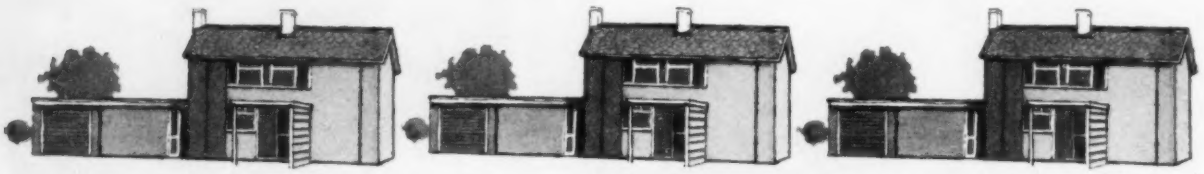
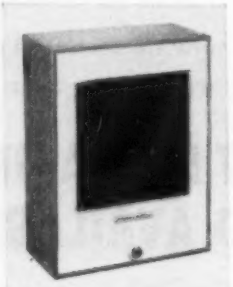
AGA heating system plus insulation gives 26% fuel-saving in Tonbridge houses



A FEW lucky people soon moving to Tonbridge will be wondering where the winter went. For their houses have 'Built-in Warmth'; and integrated heating and insulation design that means, for the first time, scientific central heating at small additional cost. And compared with the conventional system that would give the same warmth, it costs up to 26% less to run, and up to £80 less to install.

THE HEATING SYSTEM

An Aga OF 50 boiler, fired by BP Domesticol, produces hot water for domestic use as well as central heating. The water is pumped through small-bore pipes to a 10,000 Btu/h wall-model Agavector in the lounge/dining area, a 15,000 Btu/h built-in model discharging into both the lounge/dining area and the hall, and to a smaller 4,000 Btu/h Agavector in the kitchen. The remainder of the house is fitted with panel-type radiators, and both bathrooms have heated towel rails. A 40 gallon indirect cylinder is fitted in the linen cupboard.



10,000 Btu AGAVECTOR

The 10,000 Btu/h Agavector in the lounge/dining area has a three-speed fan with a manually operated control giving an output of 6,000 8,000 or 10,000 Btu/h and is controlled thermostatically at any pre-set temperature. This is the latest Agavector, measuring 16″ x 20″ high, and gives the same heating effect as 60 square feet of conventional radiators. The other Agavectors operate on a similar principal.

The Aga OF 50 boiler is installed in an annexe to the kitchen. It has a fully automatic synchronised fan-assisted burner with electric ignition. The fuel tank of 600 gallons capacity is situated outside.

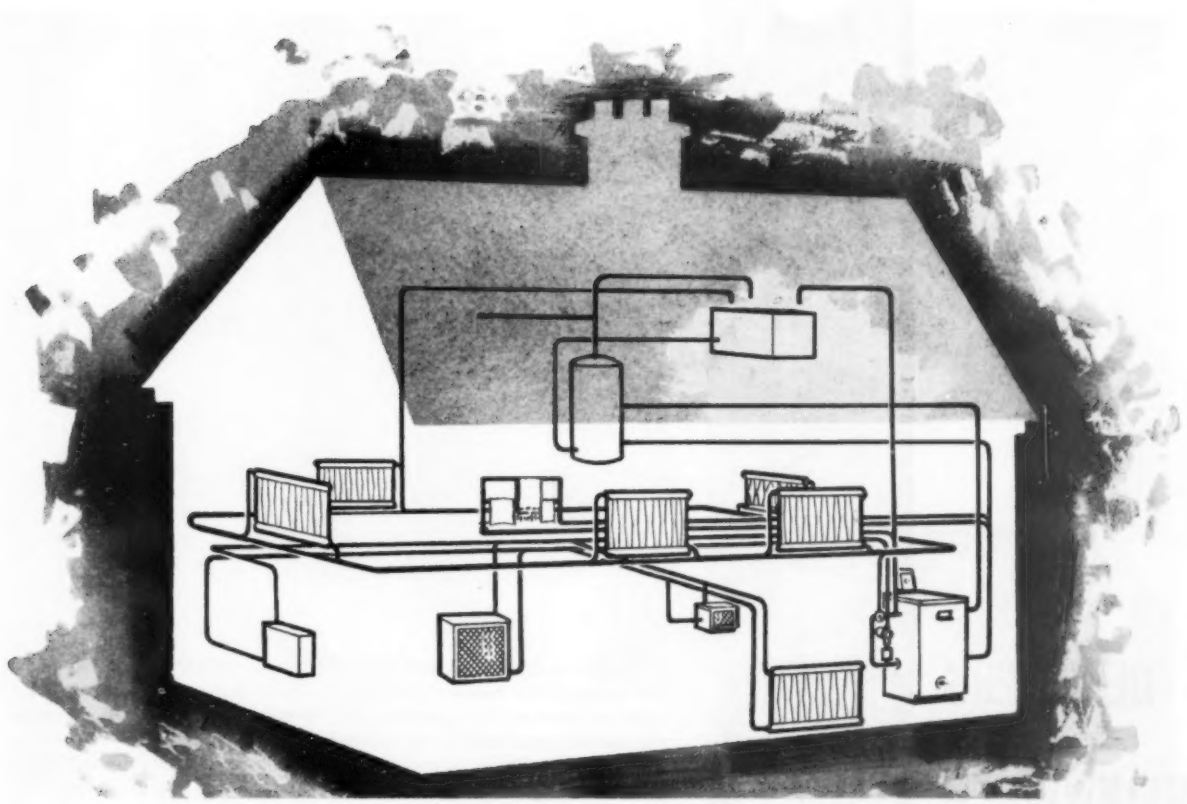
AGA OF 50 boiler

METHODS OF INSULATION

For £18.15.0d. the roof can be insulated with 2″ quilt of Fibreglass. This reduces heat losses by 75 therms per annum —costing £5.12.6d. and also helps to reduce overheating in summer.

The inner skin of the cavity wall is constructed of 4″ thick Thermalite lightweight concrete insulating building blocks. This reduces heat transmission through the walls by a third at an extra cost for materials of 1/- per yard super, or a total of £9 for the whole house but if full account is taken of the reduction in labour charges the overall cost is cheaper than for ordinary brickwork.

All windows downstairs are double-glazed at an extra cost of about £107. This saves 70 therms per annum costing £5.5.0d. showing a return of 5%. It was decided that because a reduced temperature is usually preferred upstairs, double-glazing there was considered scarcely justified on purely economic grounds.



WHAT IT COSTS AND WHAT IT SAVES

'Built-in Warmth' results in a heat-loss reduction of 270 therms a year—some £20 worth of fuel. Because of this, a smaller heating system can be installed, saving approximately £80. The additional cost of insulation is estimated at £135, which after the capital saving of £80 is deducted gives a net extra cost of £55. This pays for itself in fuel-saving in under three years. The table compares heat losses in a conventional house and a 'Built-in Warmth' house, and is calculated for an outside temperature of 30°F, whilst maintaining internal temperatures of 70°F downstairs and 55°F upstairs. Notice that the maximum heating load is well within the capacity of a 50,000 Btu/h boiler instead of a considerably larger model.

Room	Heat losses of conventional house *(traditional construction)* Btu/h	Heat losses of house with **'Built-in Warmth'** Btu/h	Appliance rating for house with **'Built-in Warmth'** Btu/h
Lounge/dining area	16,800	12,300	Convector 10,000
Hall and landing	8,600	5,900	Convector 15,000 *
Study	4,250	3,100	Radiator 3,060
Kitchen	5,500	4,700	Convector 4,000
Bedroom 1	7,700	4,900	Radiator 5,100
Bedroom 2	2,900	1,900	Radiator 2,040
Bedroom 3	3,600	2,200	Radiator 2,200
Bedroom 4	3,050	2,000	Radiator 2,040
Bathroom 1	1,000	1,000	Towel rail 1,000
Bathroom 2	1,000	1,000	Towel rail 1,000
Linen cupboard	—	—	Cylinder —
	54,400	**39,000**	**45,440**

**this unit also discharges into the lounge/dining area.*

Corrected for an average temperature of 45°F and calculated over a season of 30 weeks at 16 hours a day, the overall saving amounts to 270 therms a year worth over £20.

AGA HEATING APPLIANCES BY ALLIED IRONFOUNDERS

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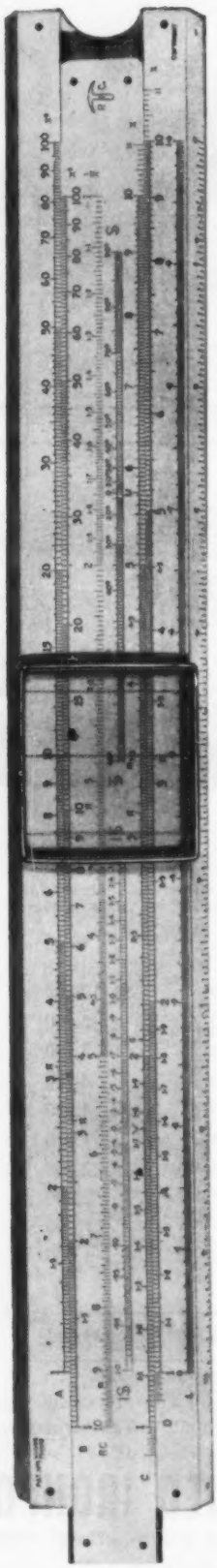

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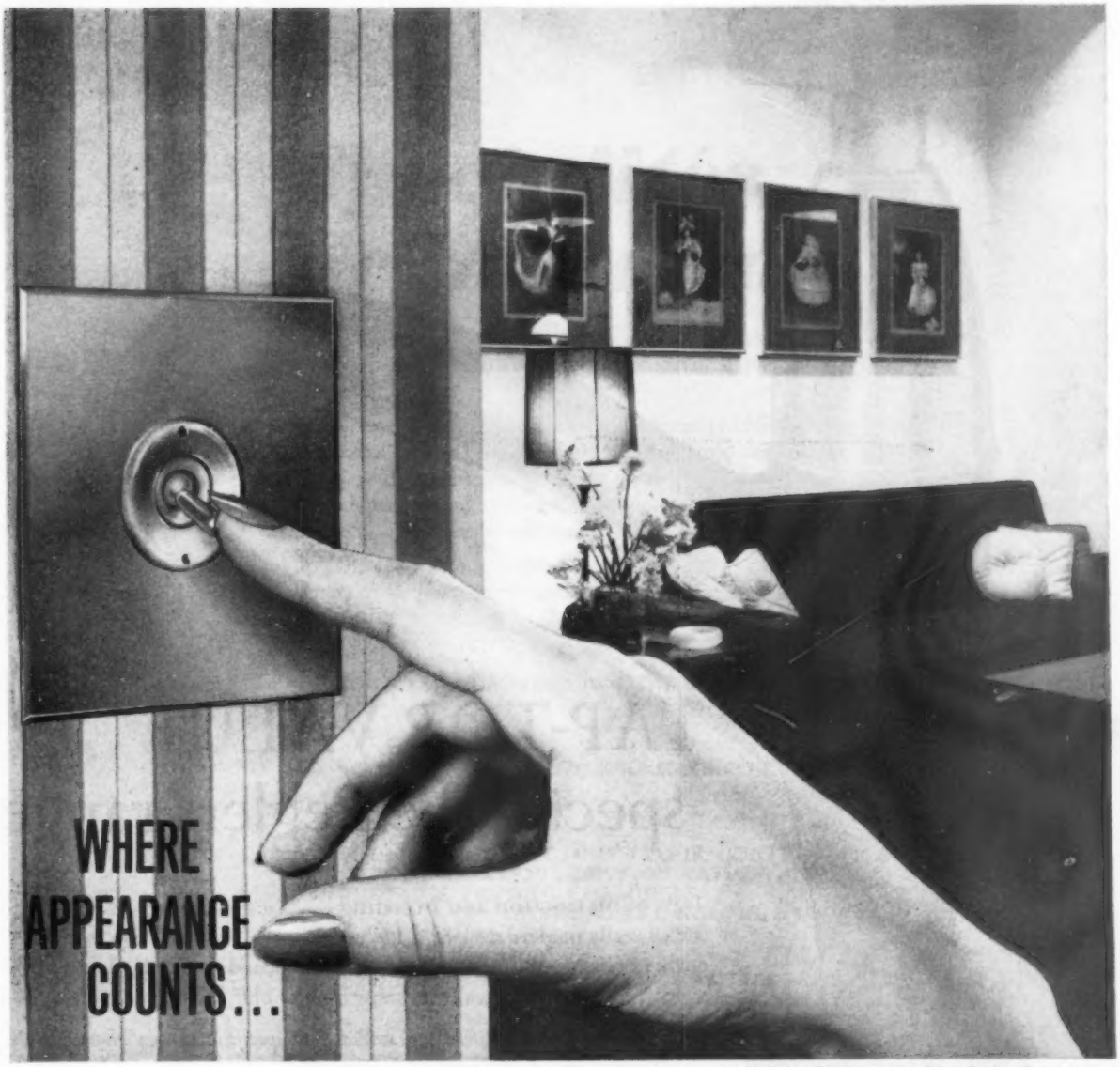

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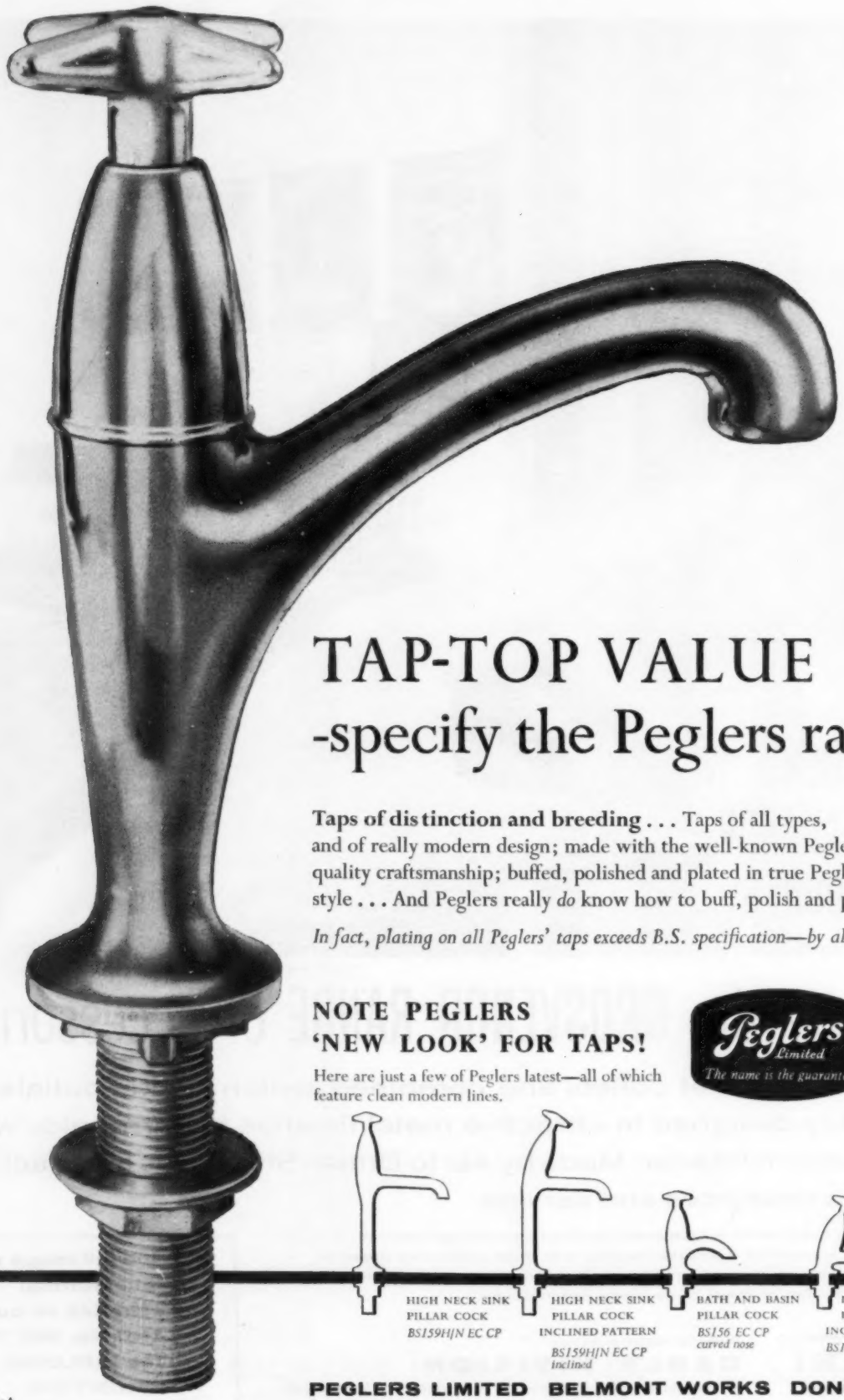

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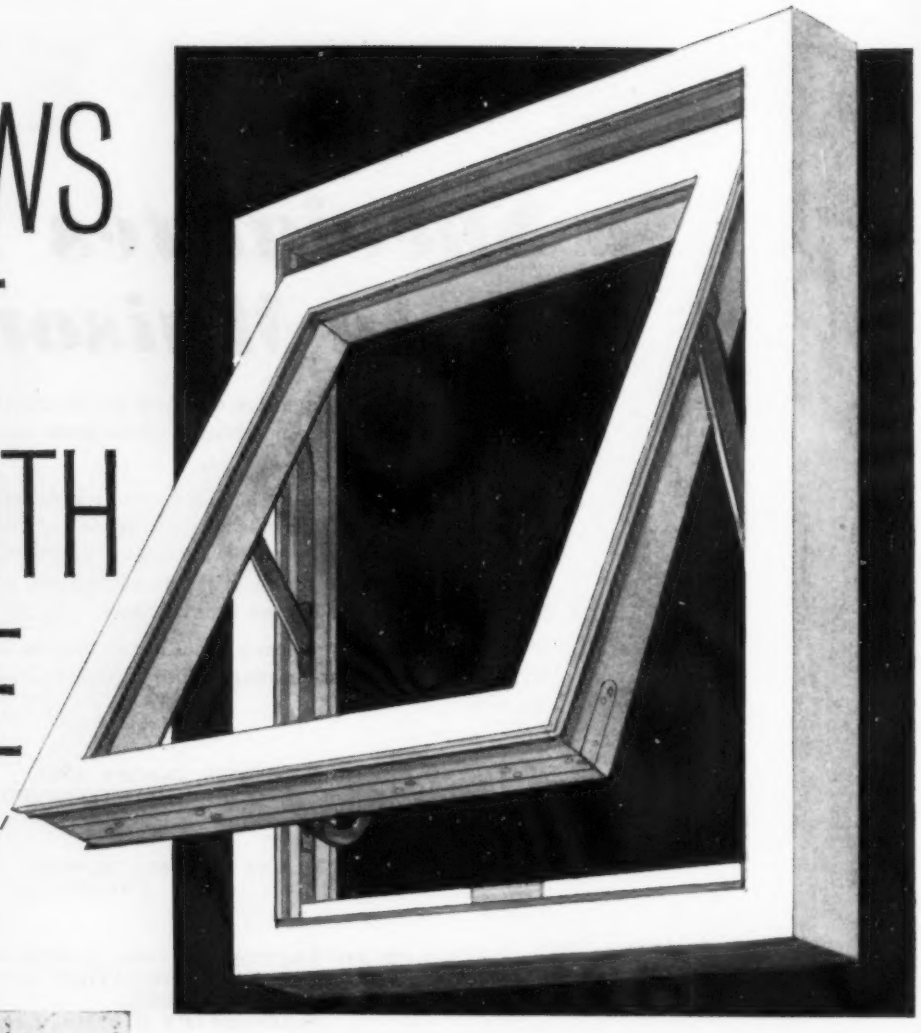

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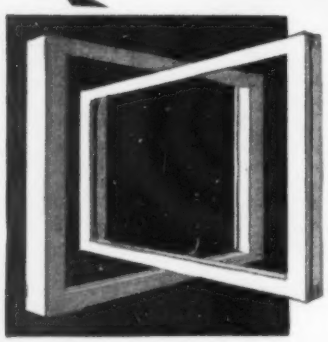

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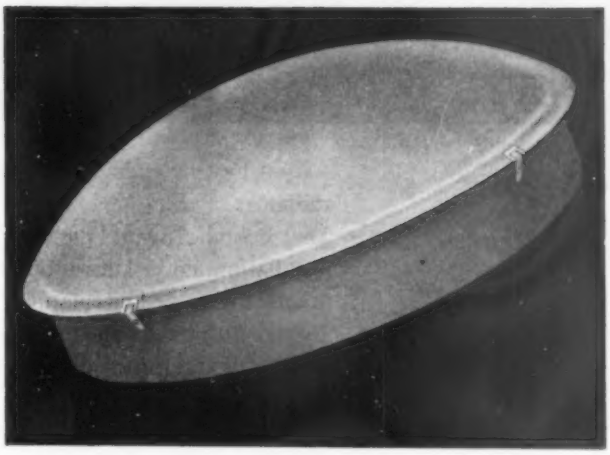

Circular Domes up to 48″ diameter and Rectangular Domes up to 72″ × 48″ manufactured in ¼″ wired cast glass.

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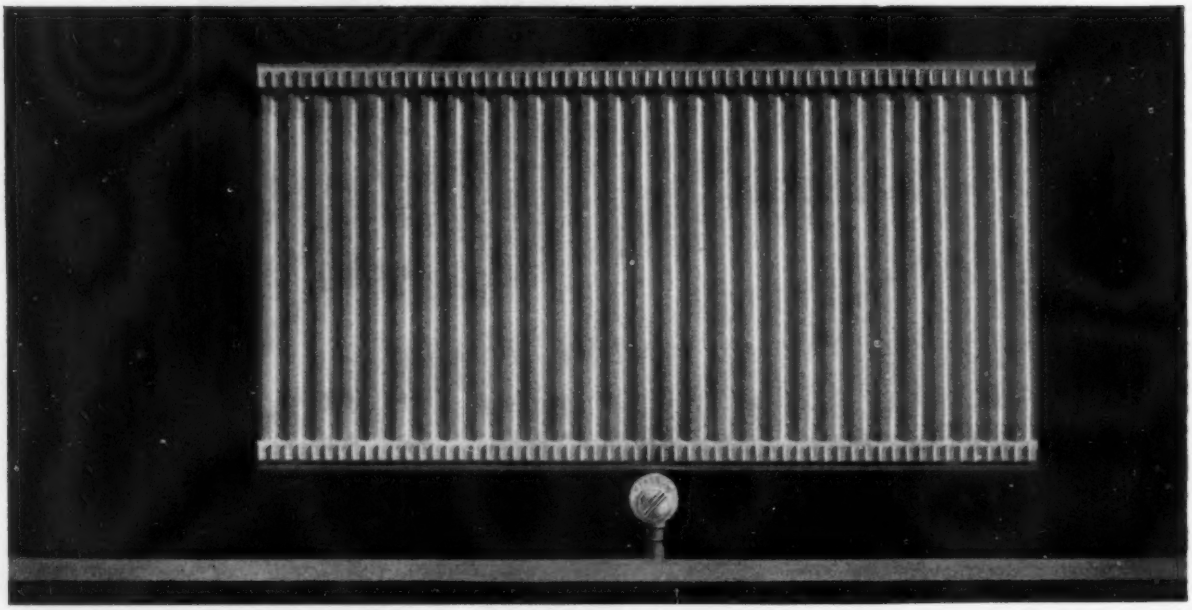

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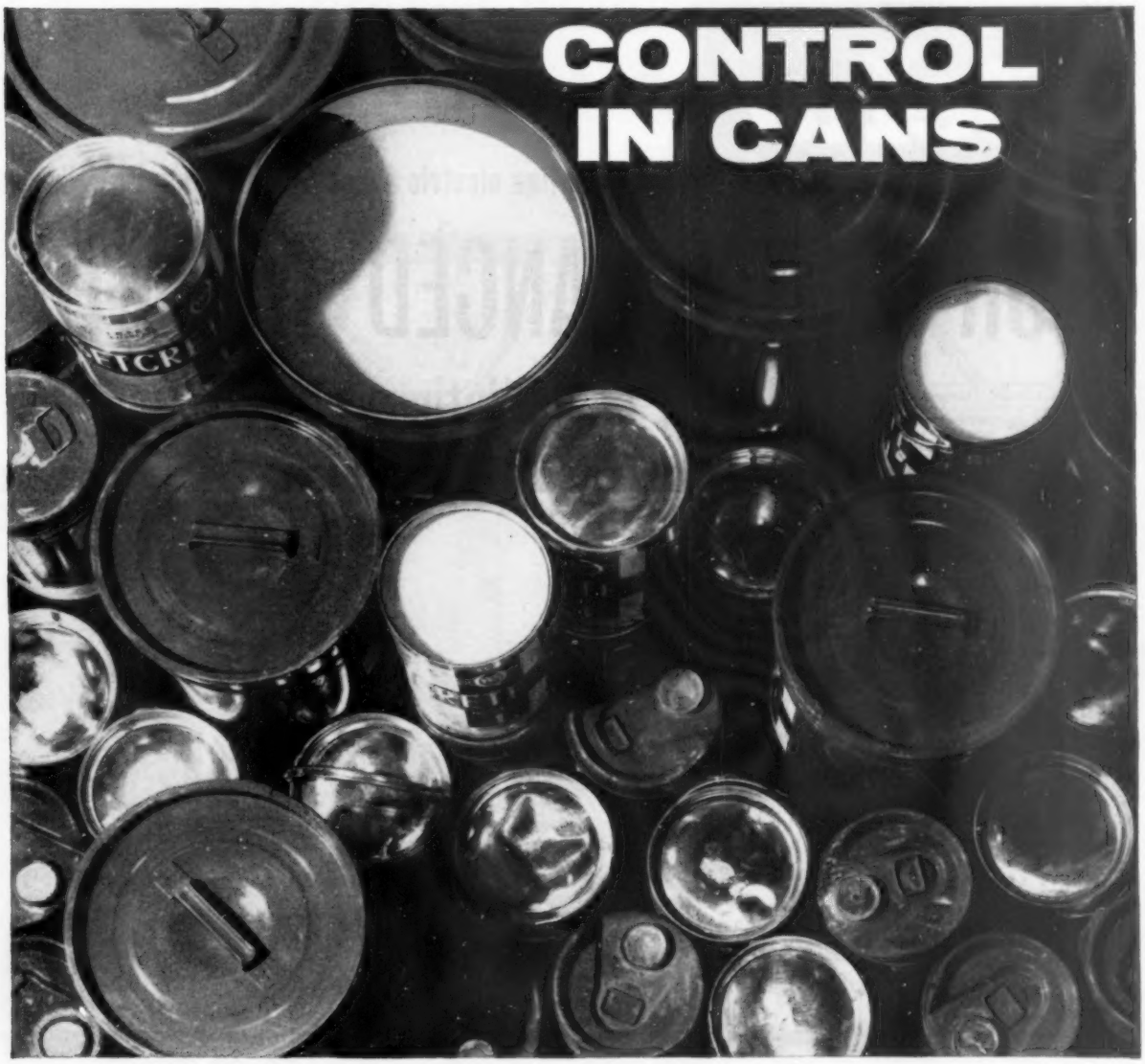

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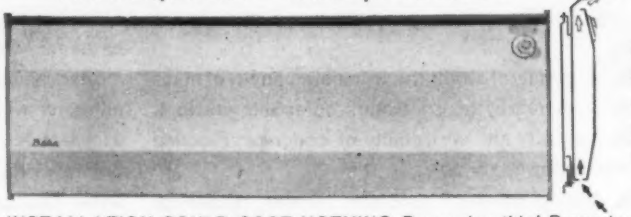

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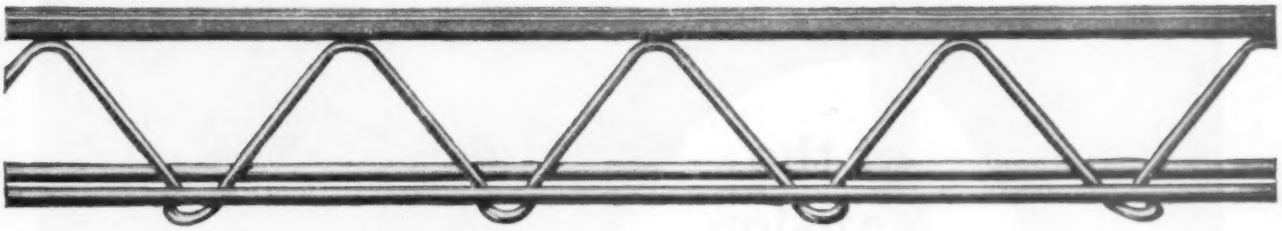

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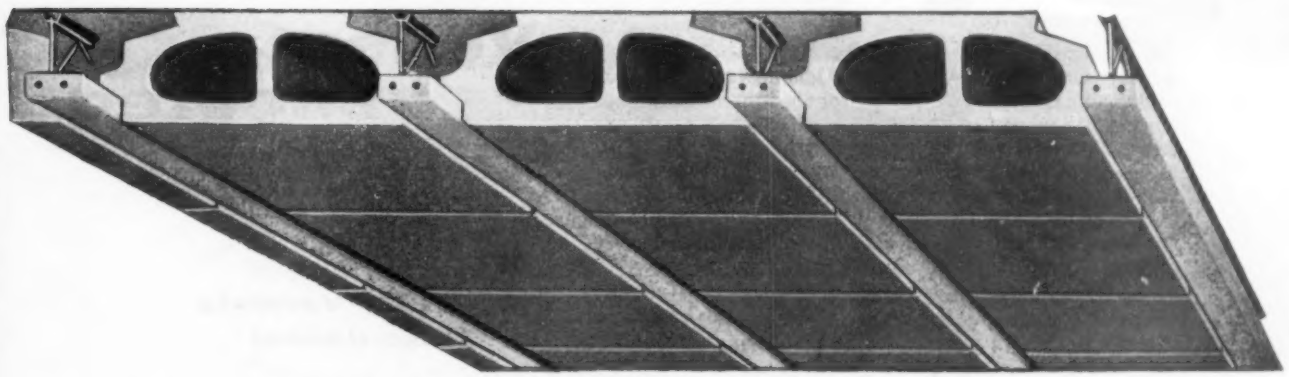

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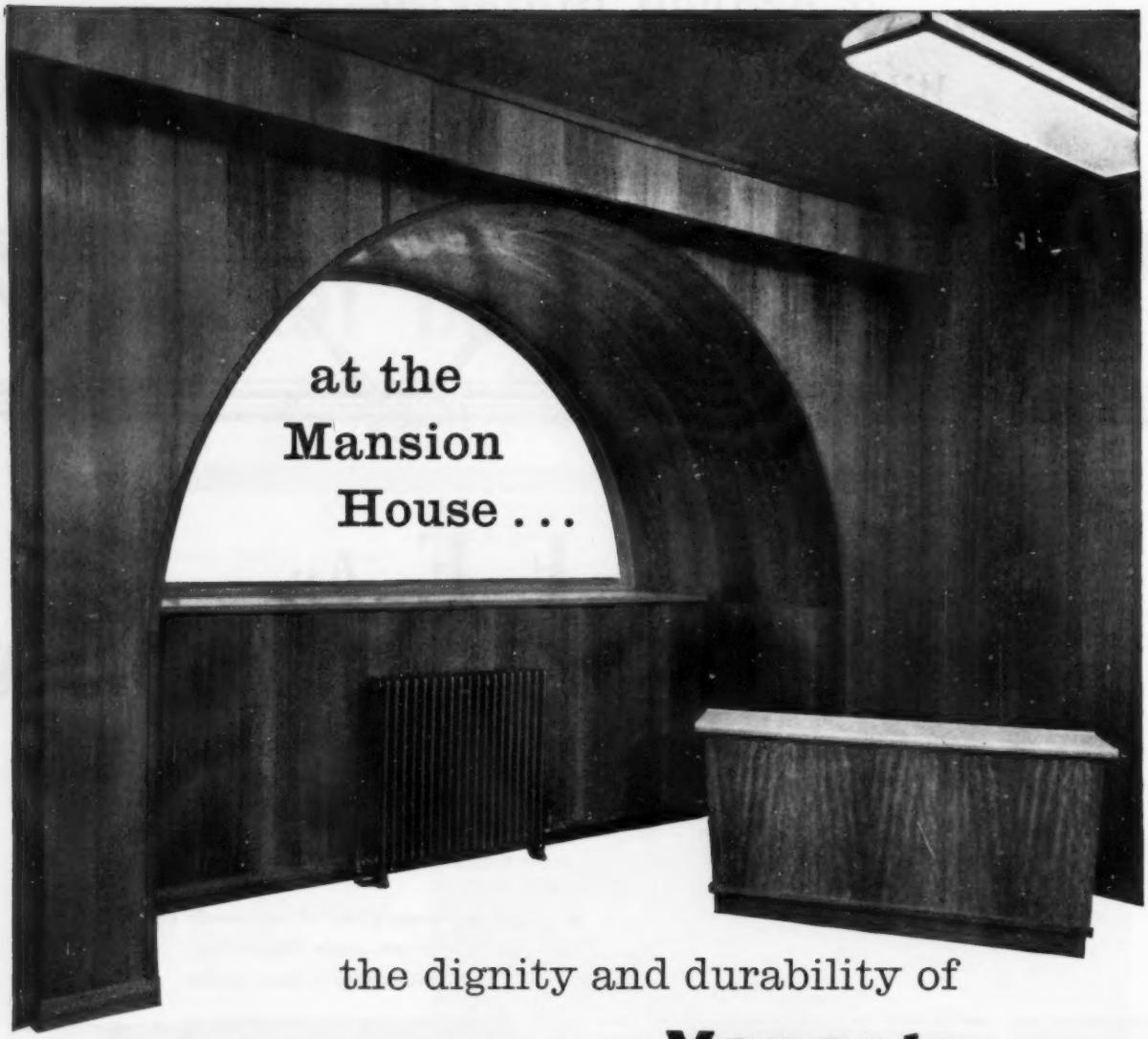

the dignity and durability of

Venesta veneered plywood

The practical elegance of Venesta veneered plywood is a notable feature of modernisation schemes in several parts of The Mansion House, London. For the scheme shown above, some 1200 square feet of British-made Gaboon plywood panels, veneered with Figured Avodire, were supplied. As the majority of the panels required were 10ft in length, the veneer faces were carefully selected to avoid jointing the veneer in the height, and the panels were matched round the walls to ensure continuity. Window arch panels were of specially thin board to facilitate bending.

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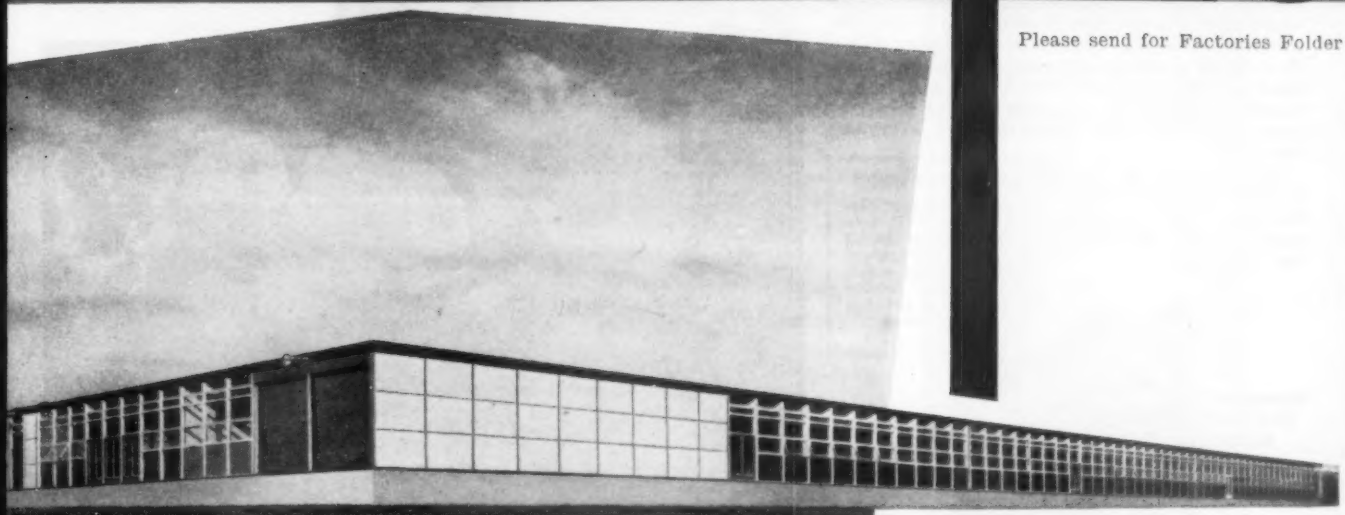

Factory at Mansfield—
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Architect—D. A. Matthews,
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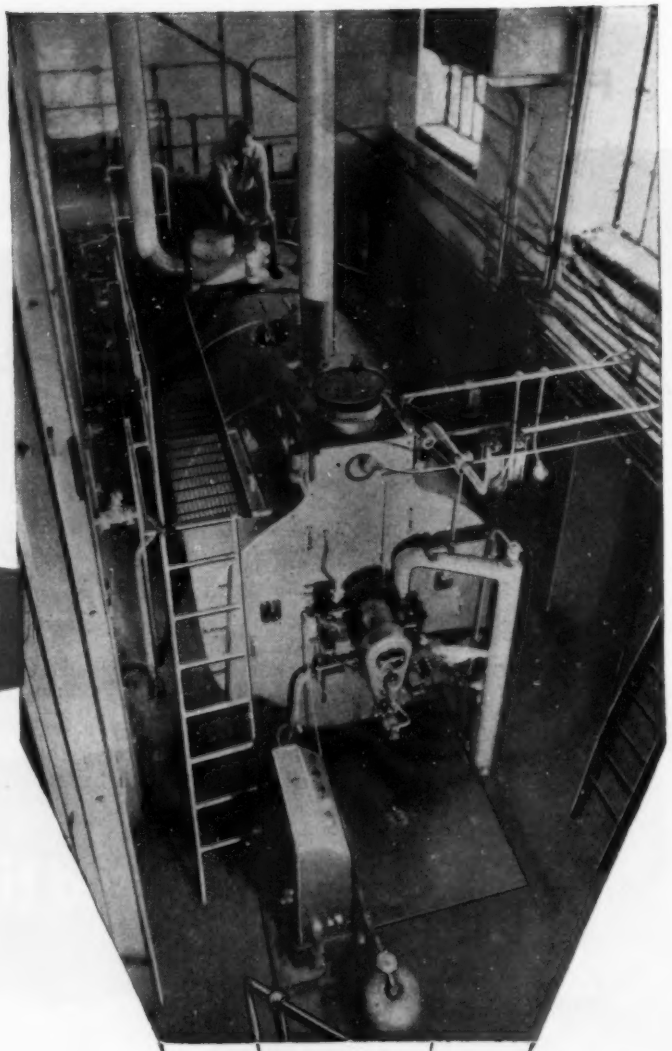

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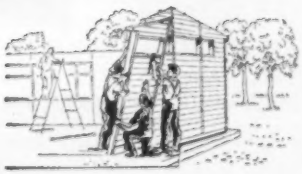

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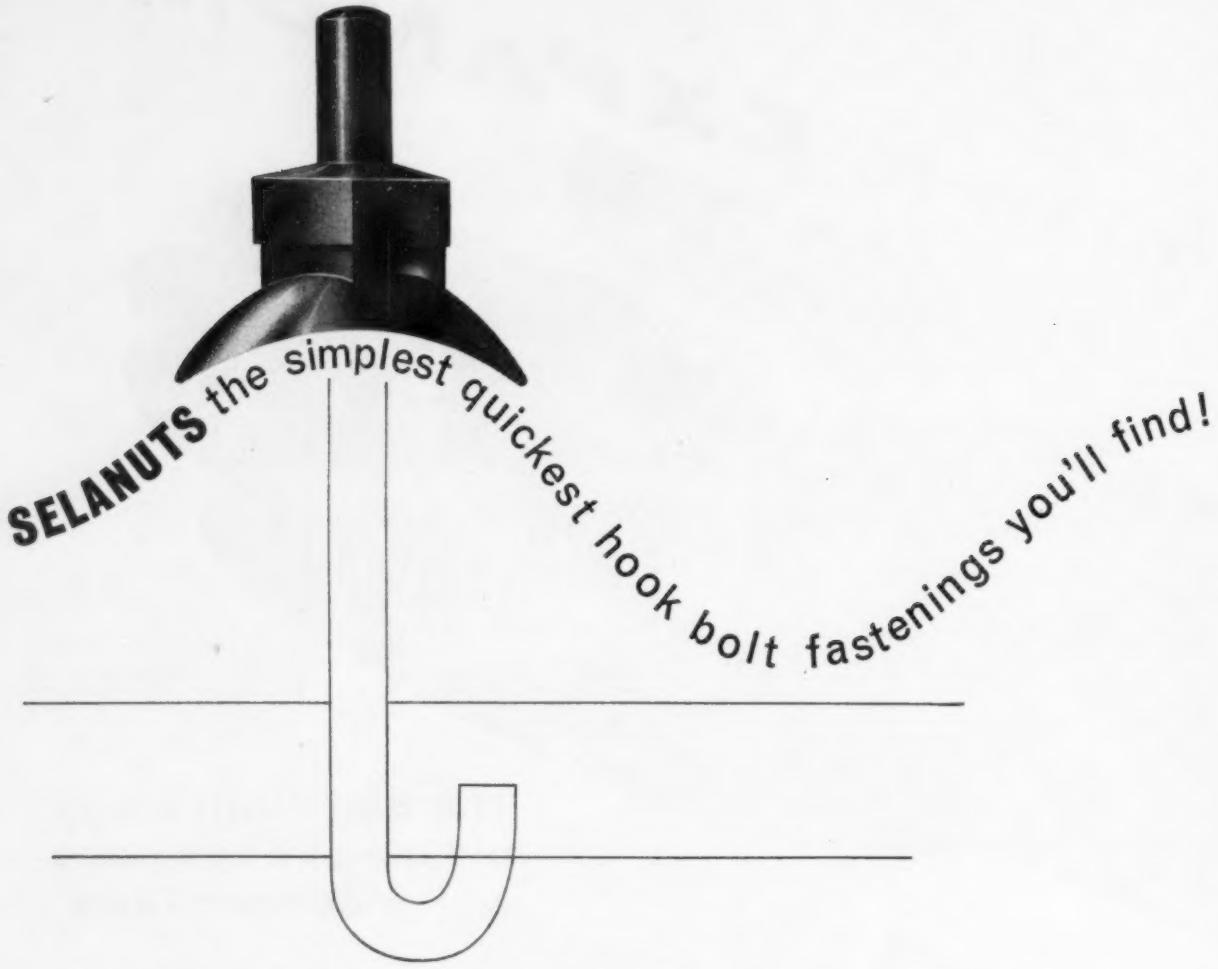

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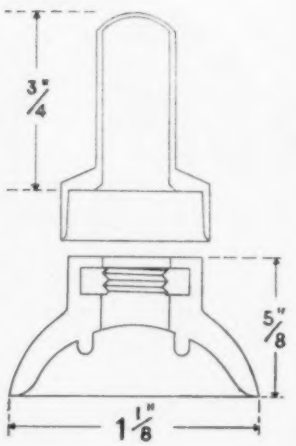

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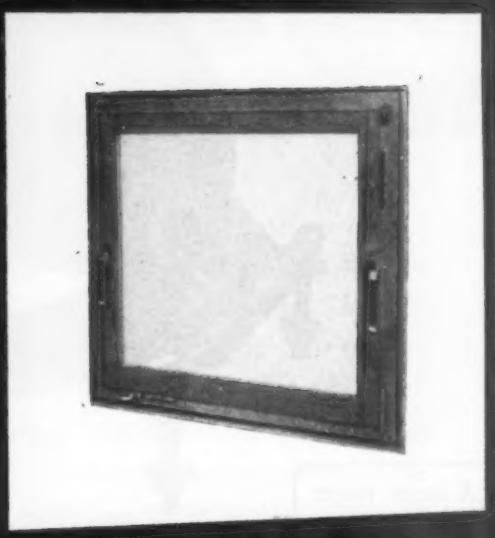
The Architects' Journal
(Supplement) November 8 1961

A new concept in window design

ROTO-VEE windows with two-way opening



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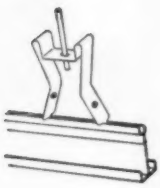
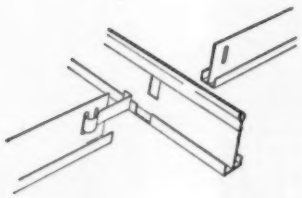
Accent on simplicity

circlgrid





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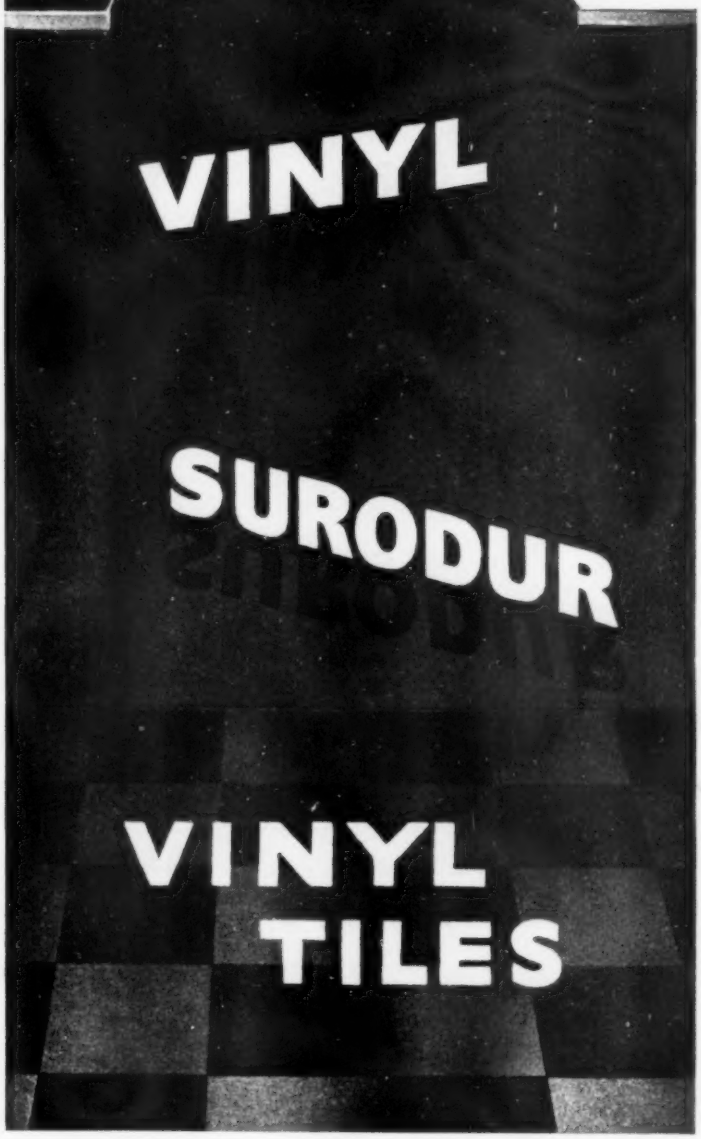

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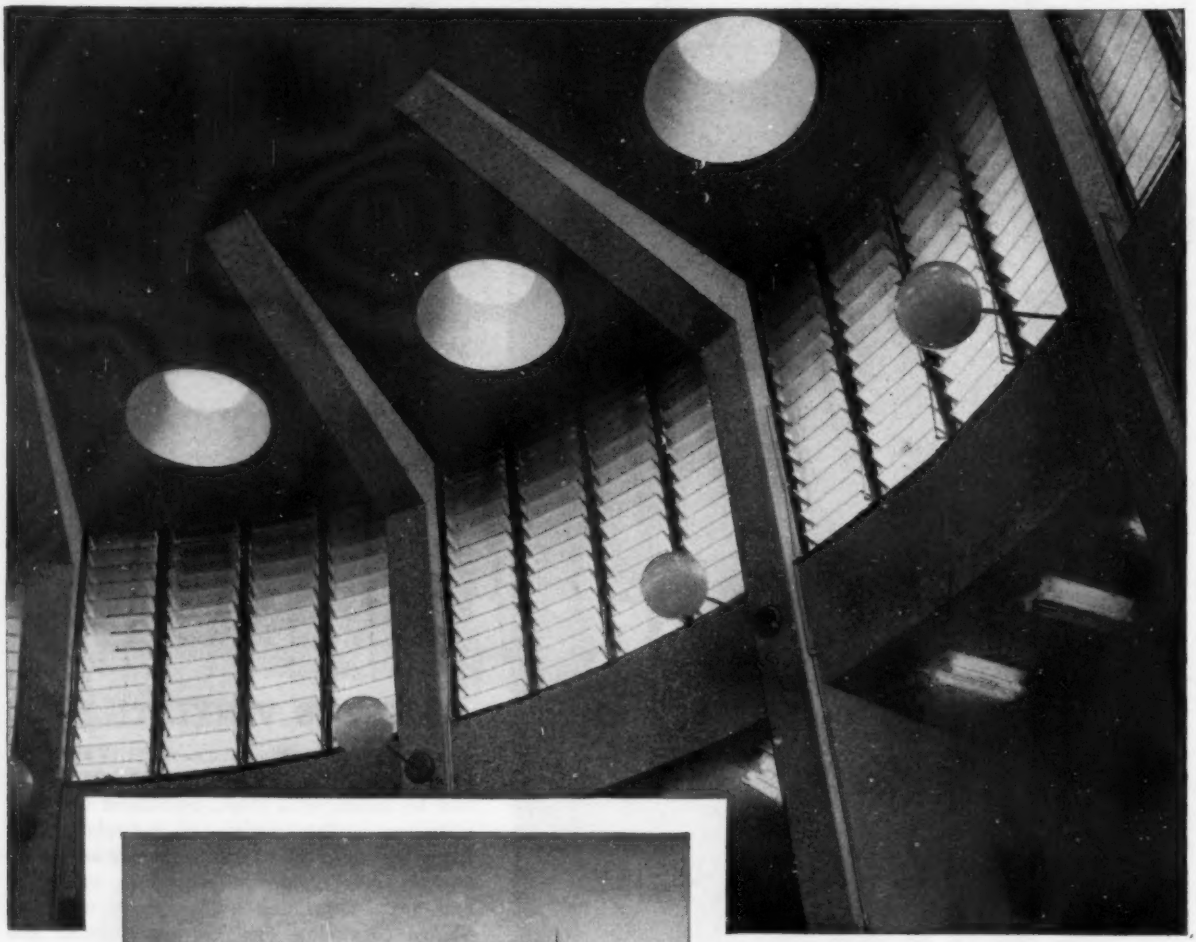

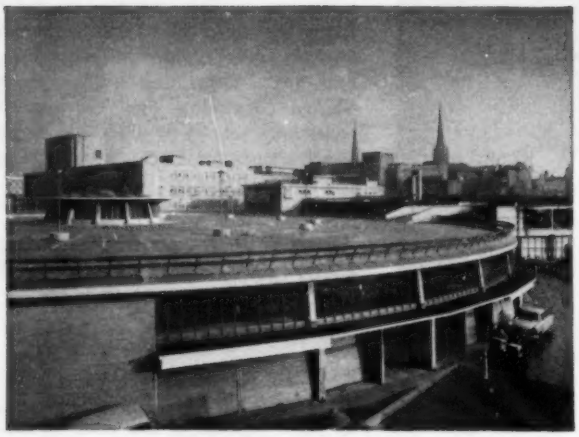

Buildings of today...

The Central Retail Market, Coventry, incorporates many interesting features including an overhead car park seen in the illustration, left. The interior illustration shows Newman's Opening Gear fixed to "Naco" Louvres supplied by Glass (Coventry) Ltd., General Contractors: W. Moss & Sons Ltd., Loughborough.

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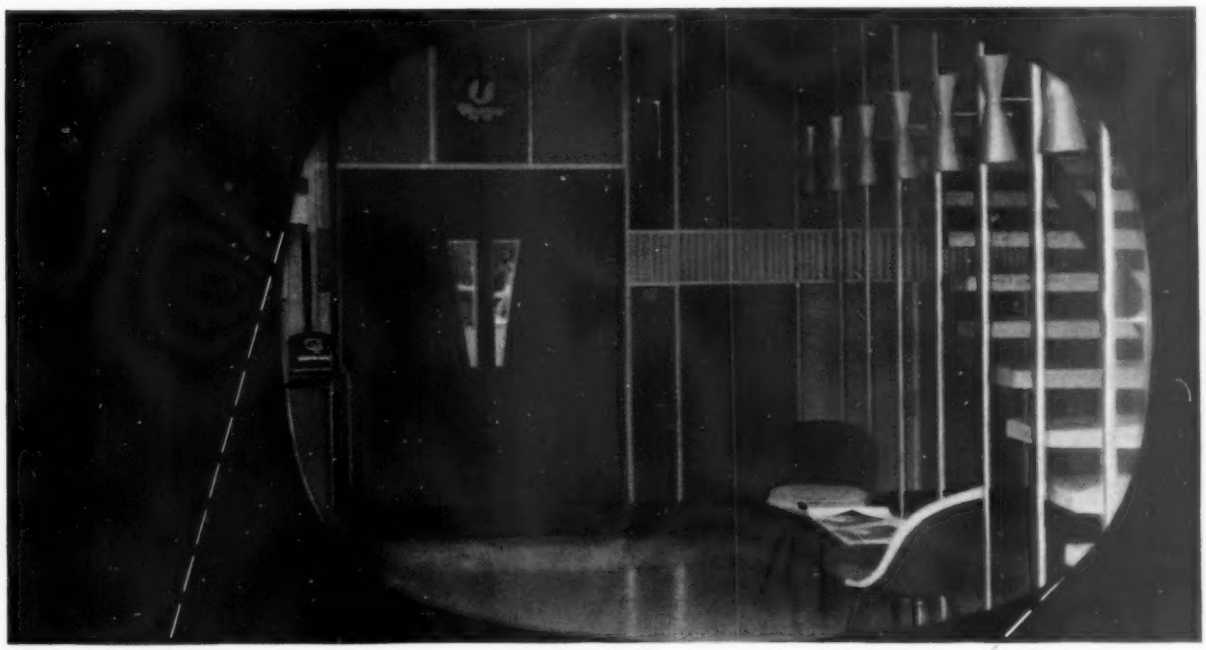

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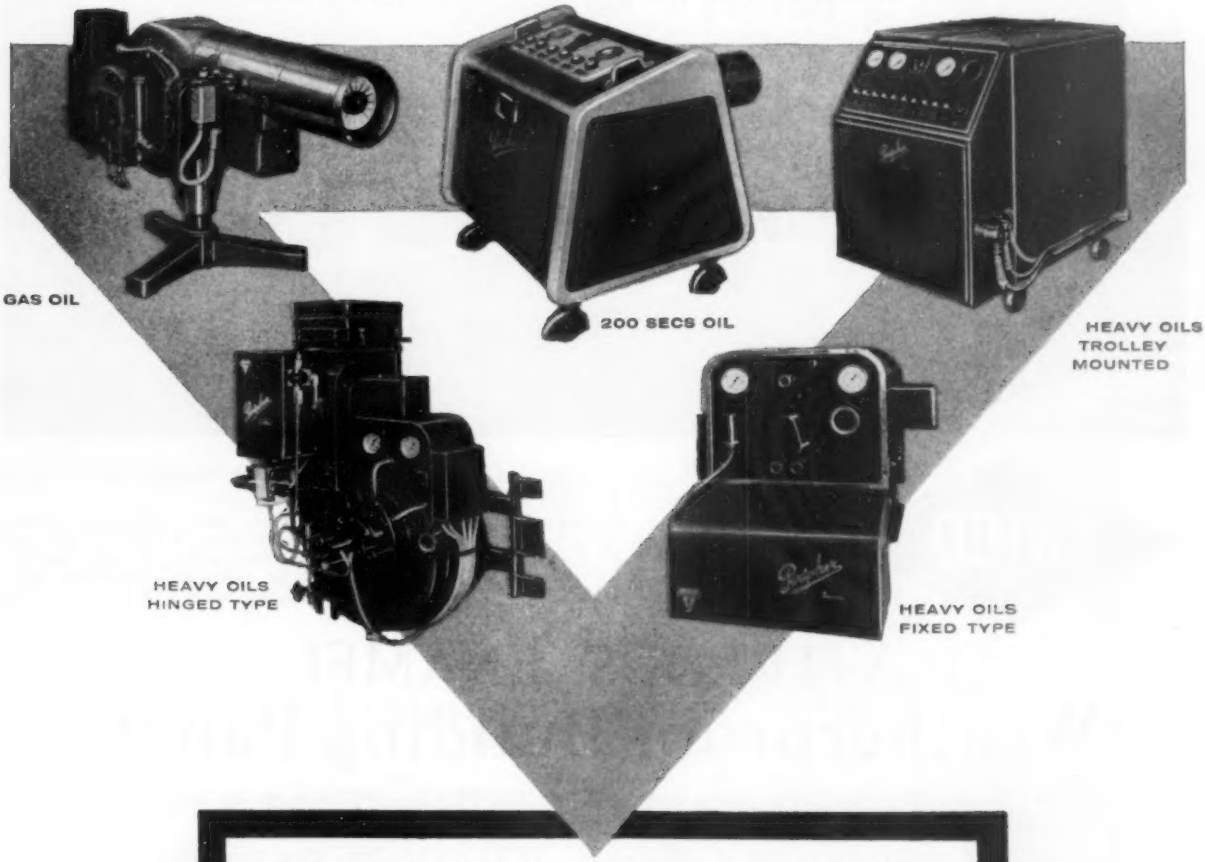

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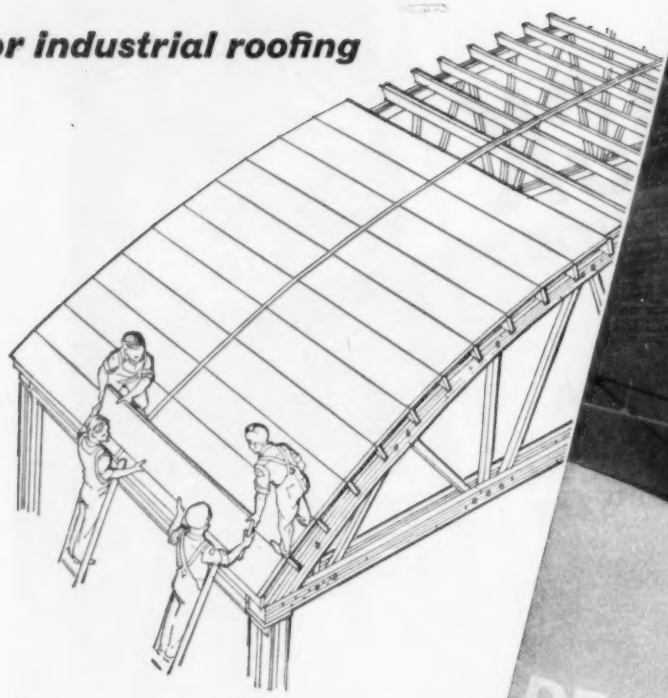

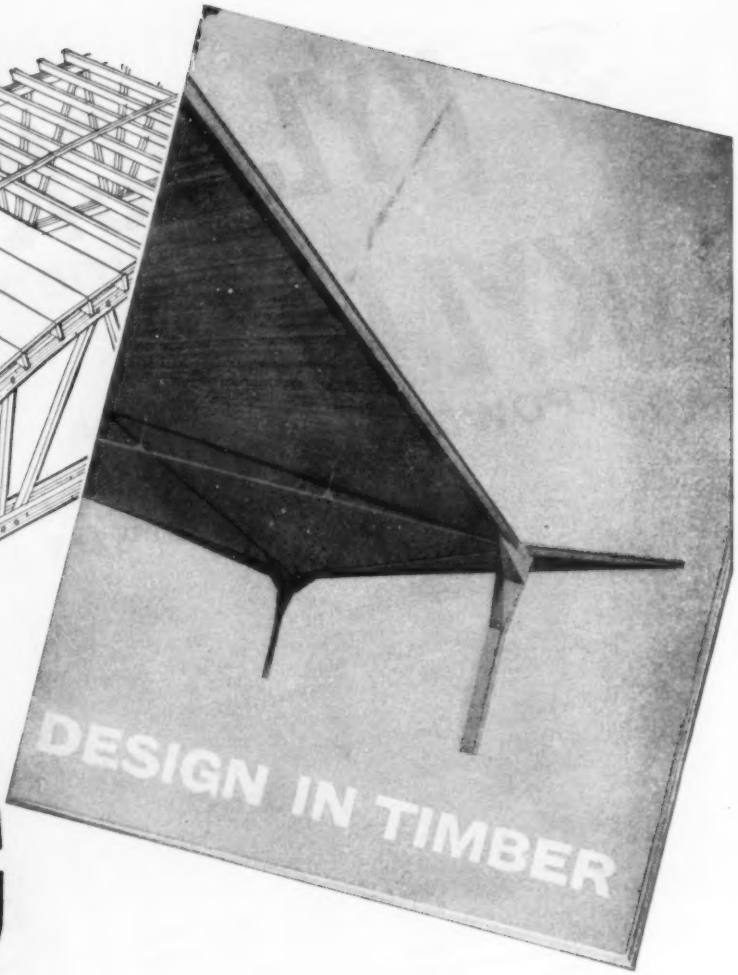

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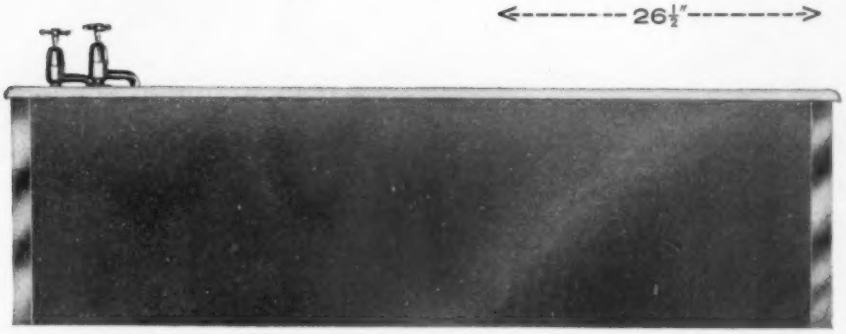

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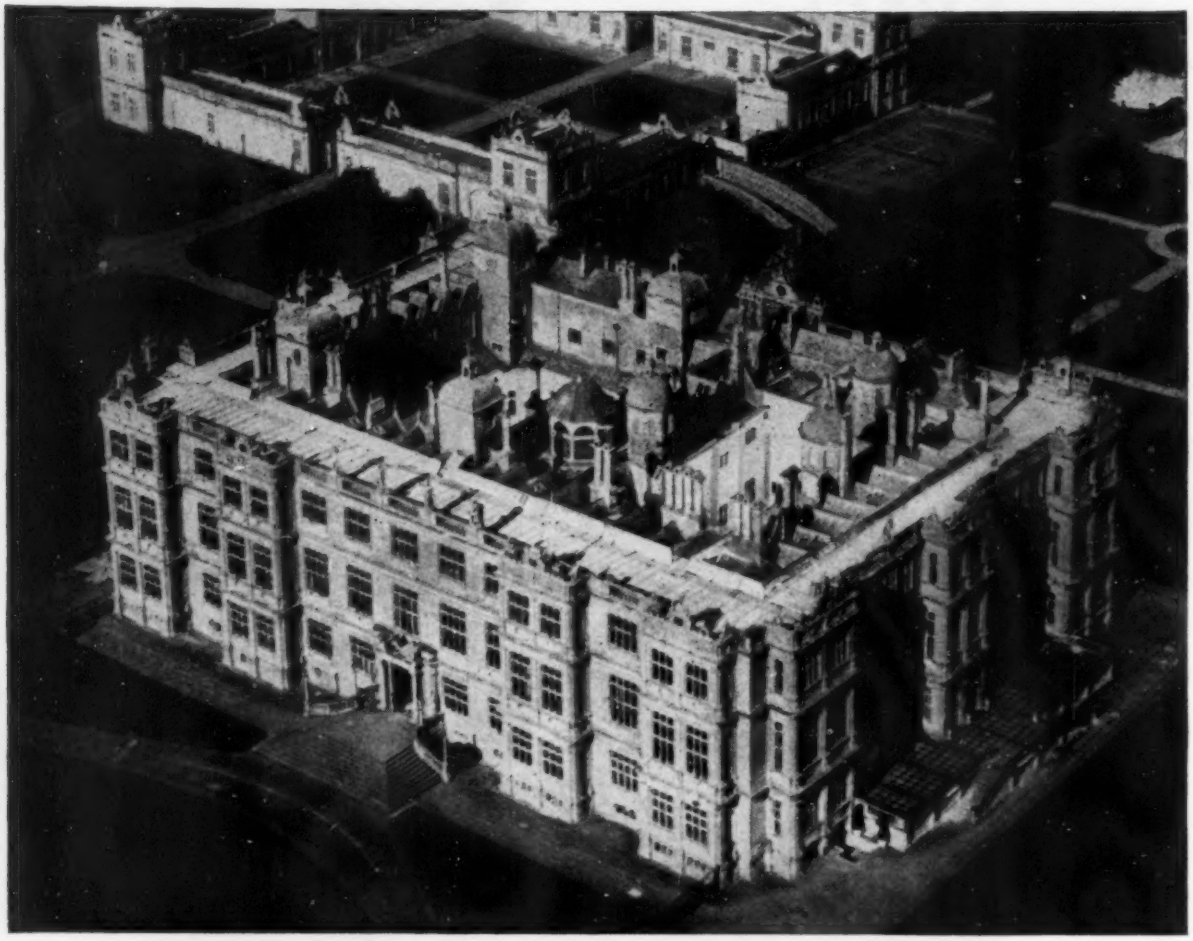

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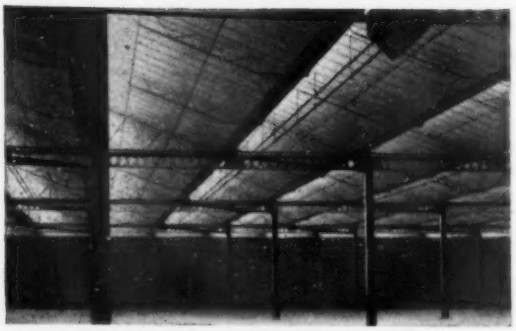

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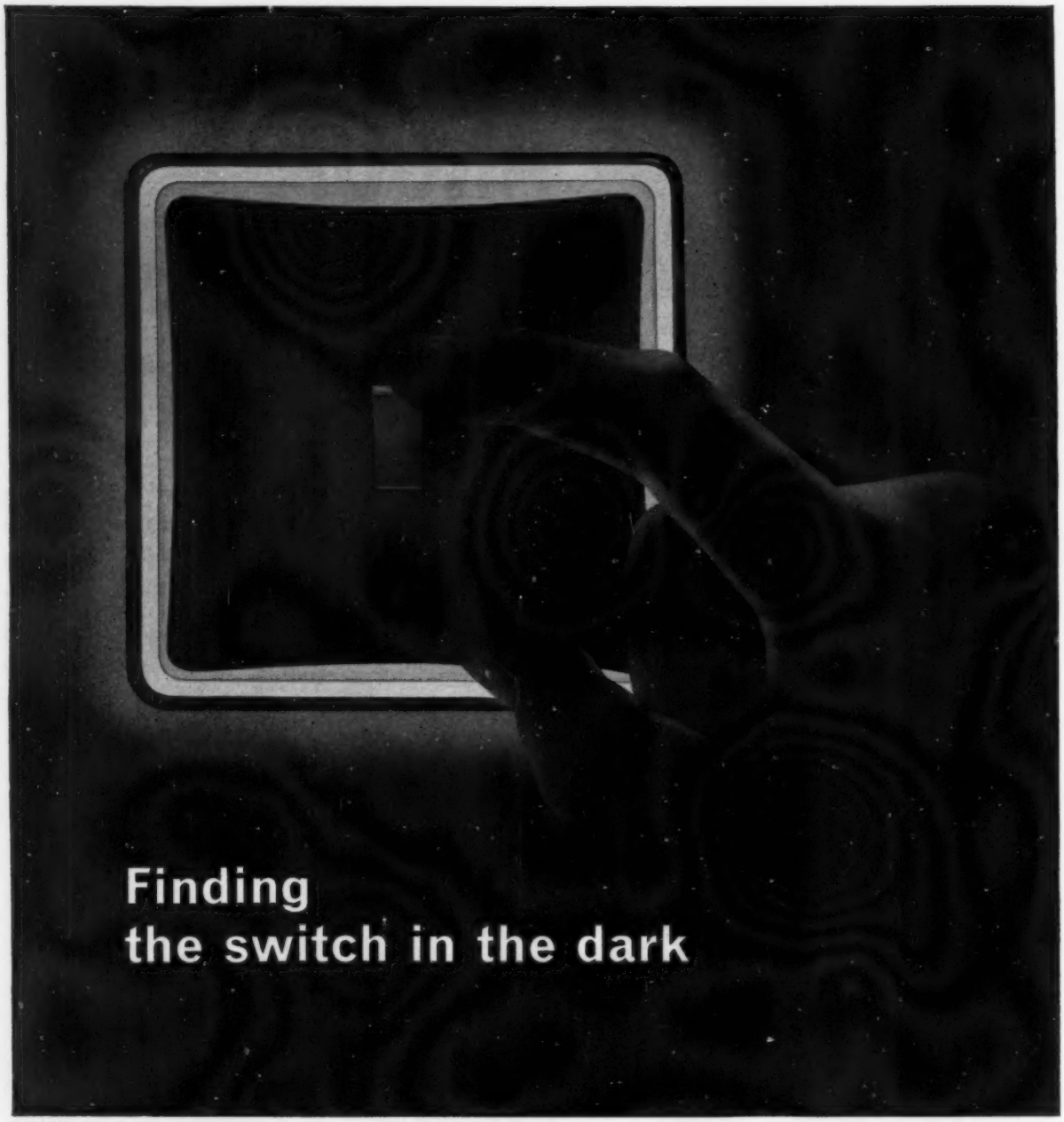

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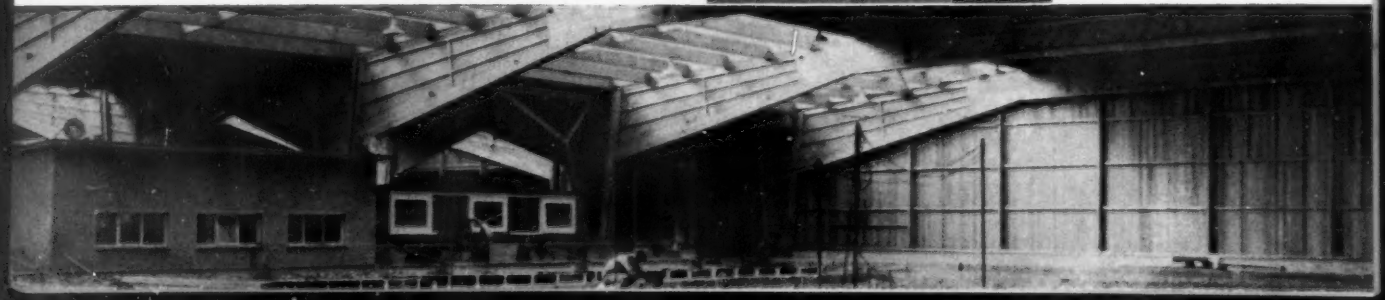

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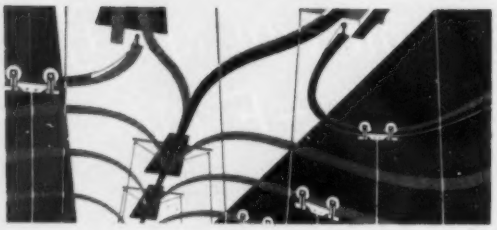

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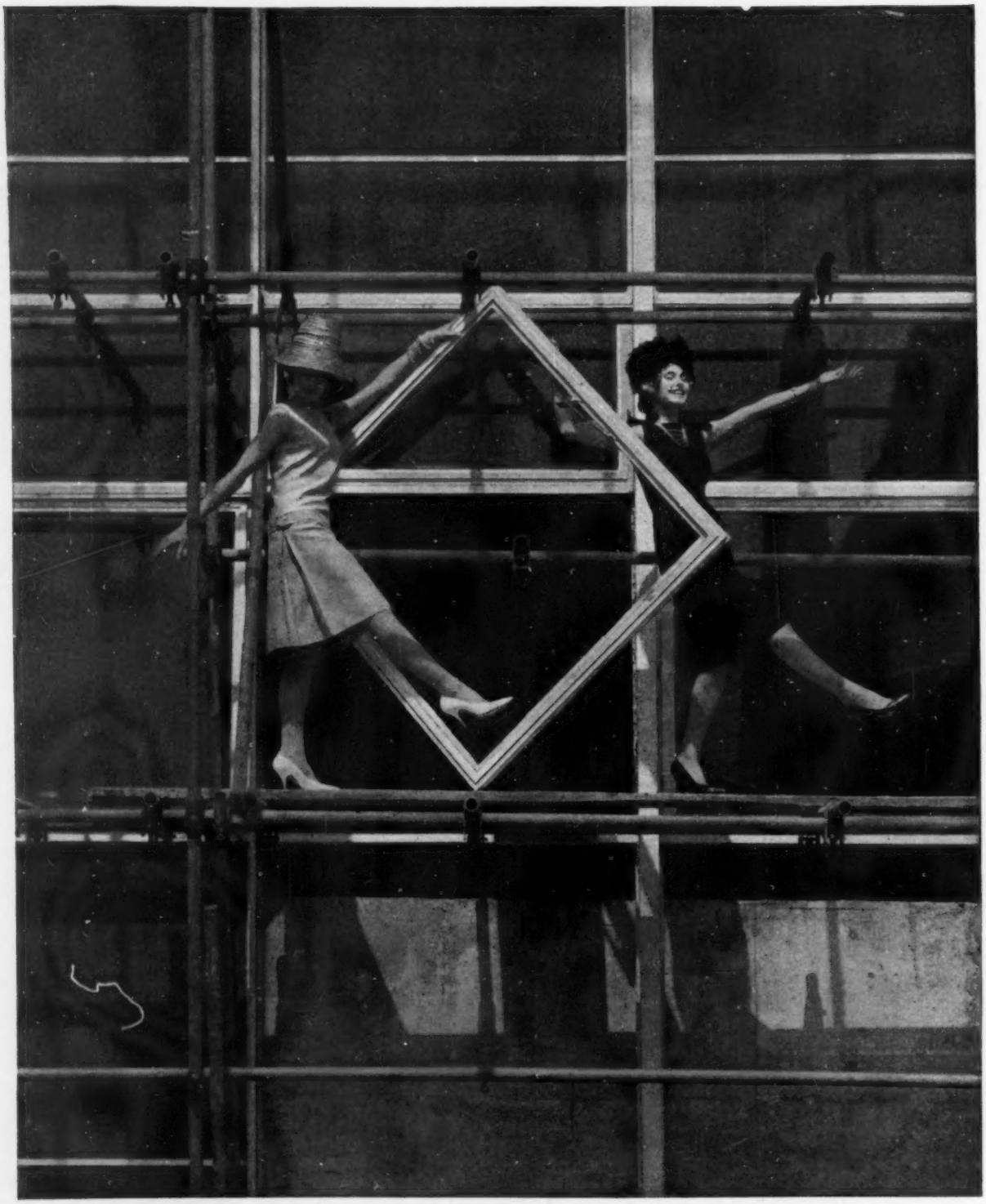

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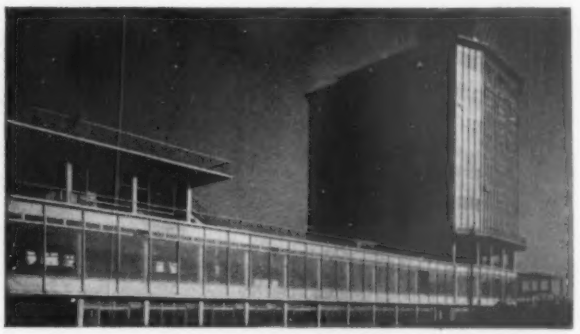
Wallspan at Manchester Airport

To accommodate ever-increasing passenger and freight traffic, a two and a half million pound extension scheme is being carried forward in two stages at Manchester Airport. Williams and Williams Wallspan was chosen for the curtain walling throughout the first stage of development, now complete, which includes the new ten-storey control tower and the first half of the terminal buildings and administration offices. Wallspan is being used also for the second stage, comprising the completion of the terminal buildings and the embarkation piers. Quick to erect and virtually maintenance free, with double glazing for sound insulation, Williams and Williams Wallspan will provide a light and happy atmosphere for all who use the new Manchester Airport—and a welcome for visitors from all over the world.

Part of the administration area high in the control tower. A feature of these rooms is the heated aluminium sills with pressed louvres. These were specially designed to counteract cold radiation from the windows due to the use of heating coils in the ceilings. They were installed as an integral part of the Wallspan.



The control tower and part of the terminal buildings. On the airport faces of these new blocks, double glazing for sound insulation was used throughout except on the visitors' lounge — people who come to watch aeroplanes like to hear them too. Infilling is in blue Escol Panels, with vitreous enamel finish, bonded to Asbestolux.

S. G. B. Roberts, Dip.Arch., A.R.I.B.A. Leonard C. Howitt, M.Arch., D.A.(Man.), Dip.T.P., D.P.A., F.R.I.B.A., M.T.P.I. *Contractors:* Richard Costain and Sons

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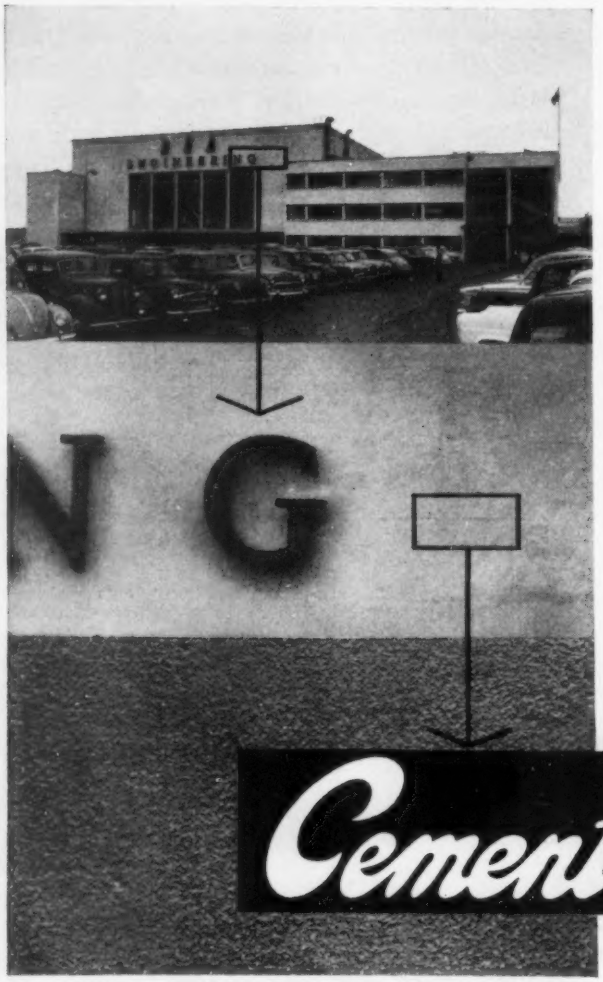

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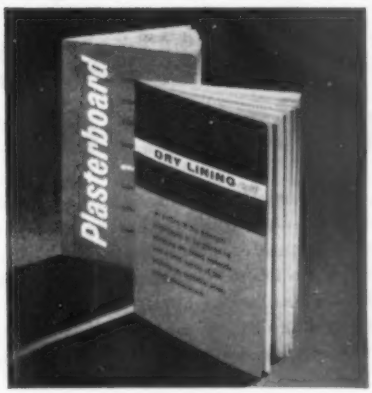

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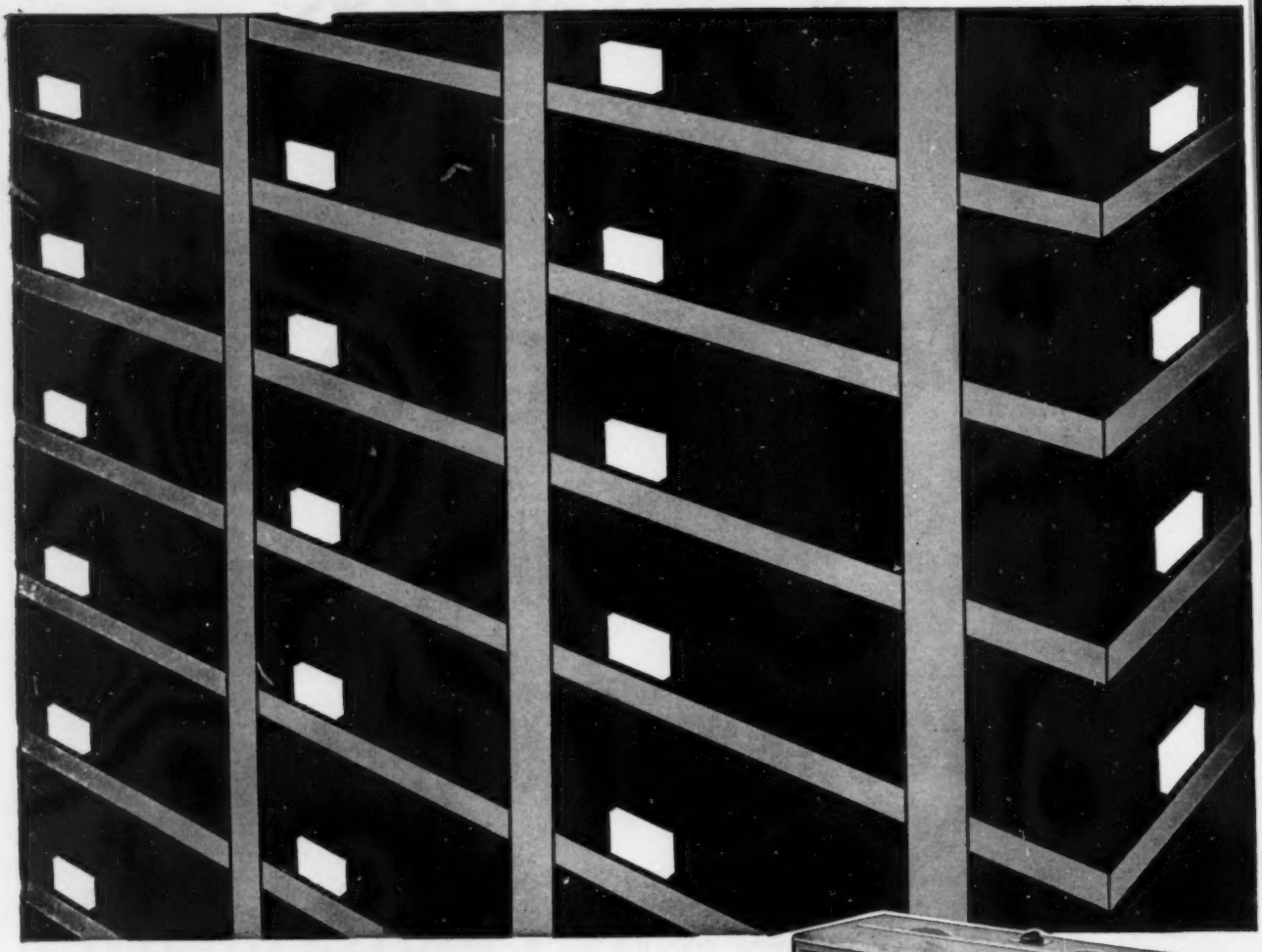

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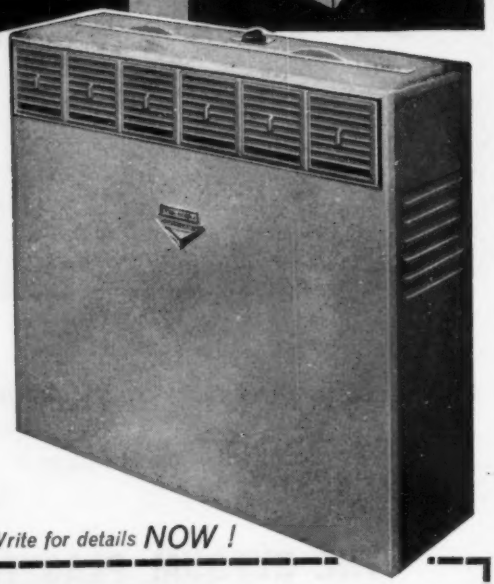

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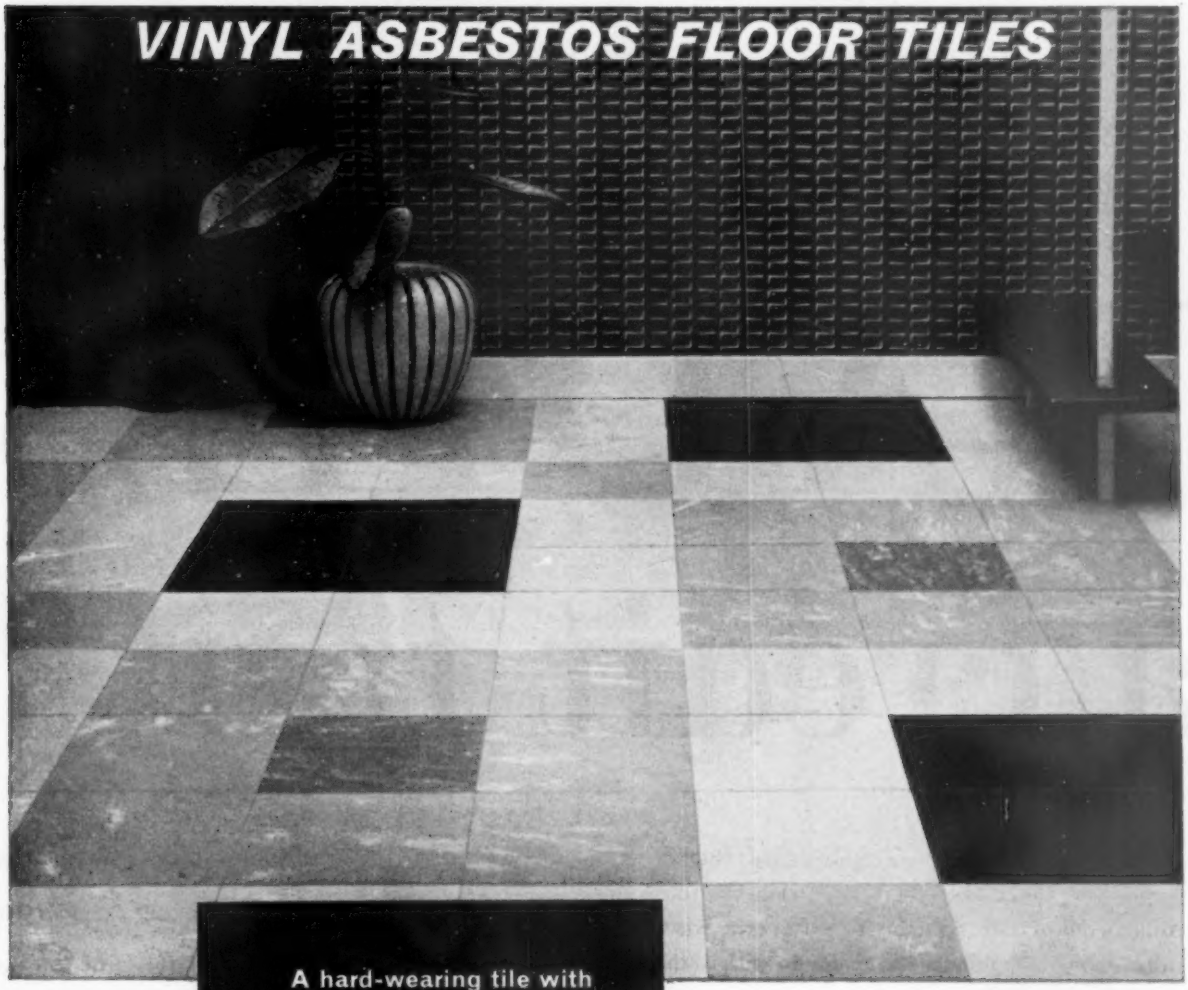

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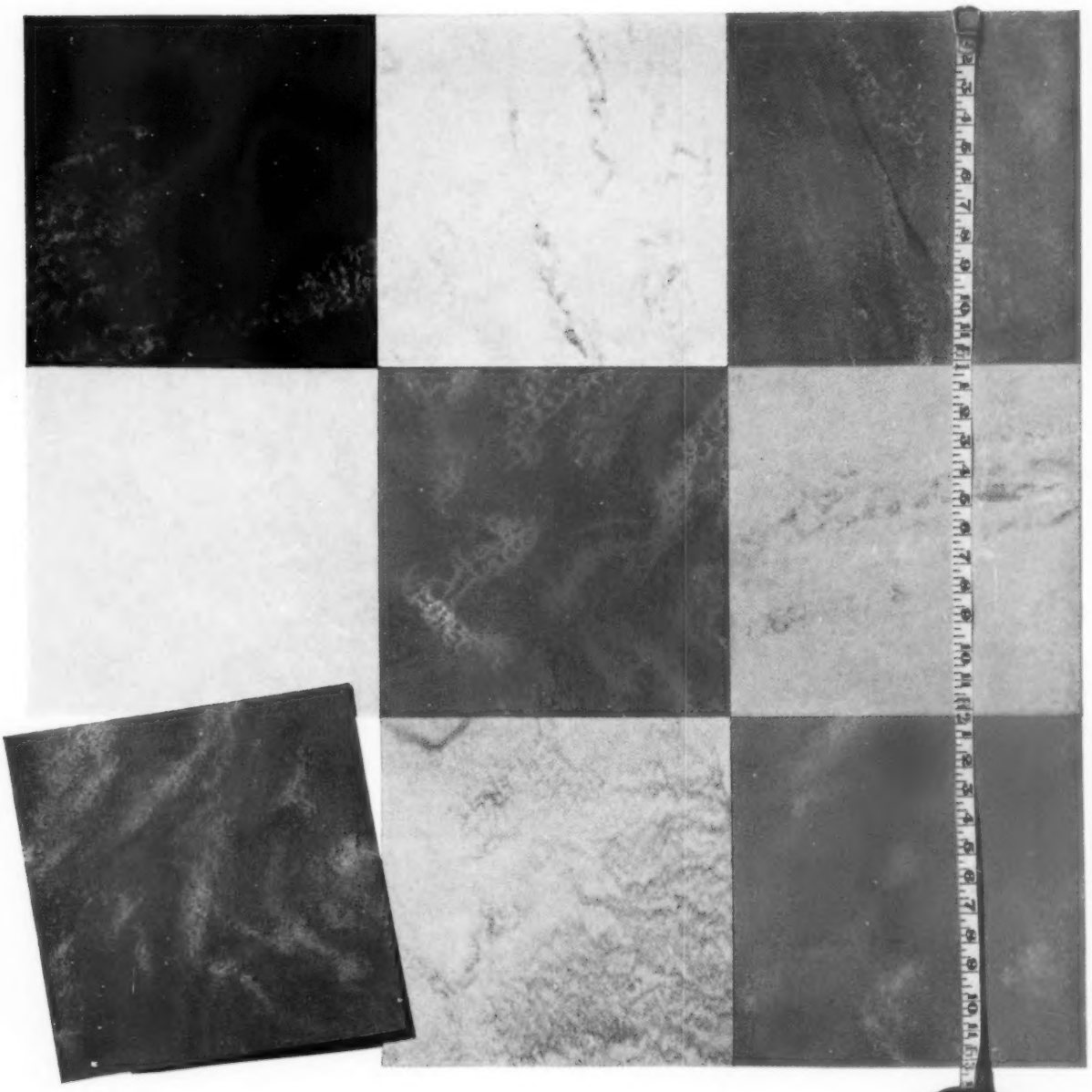

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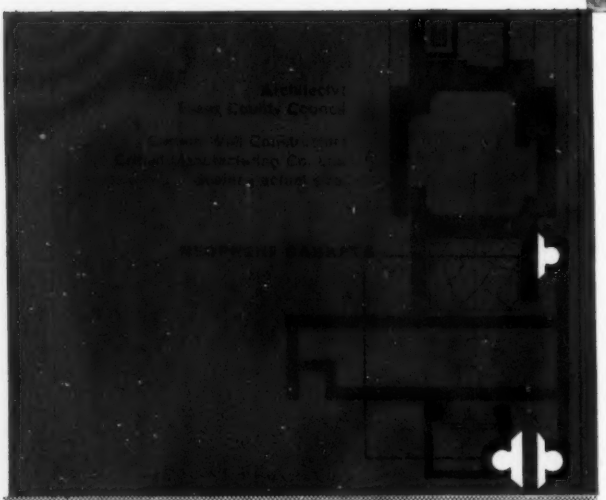

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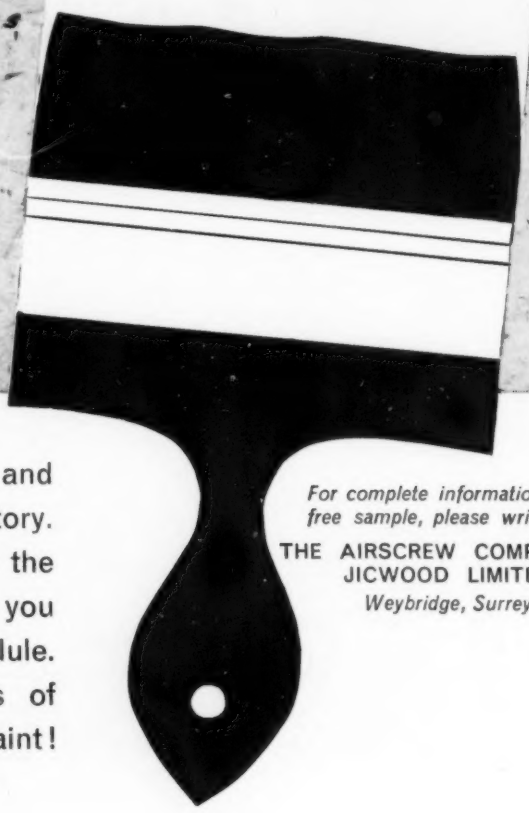

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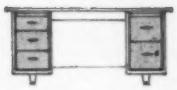

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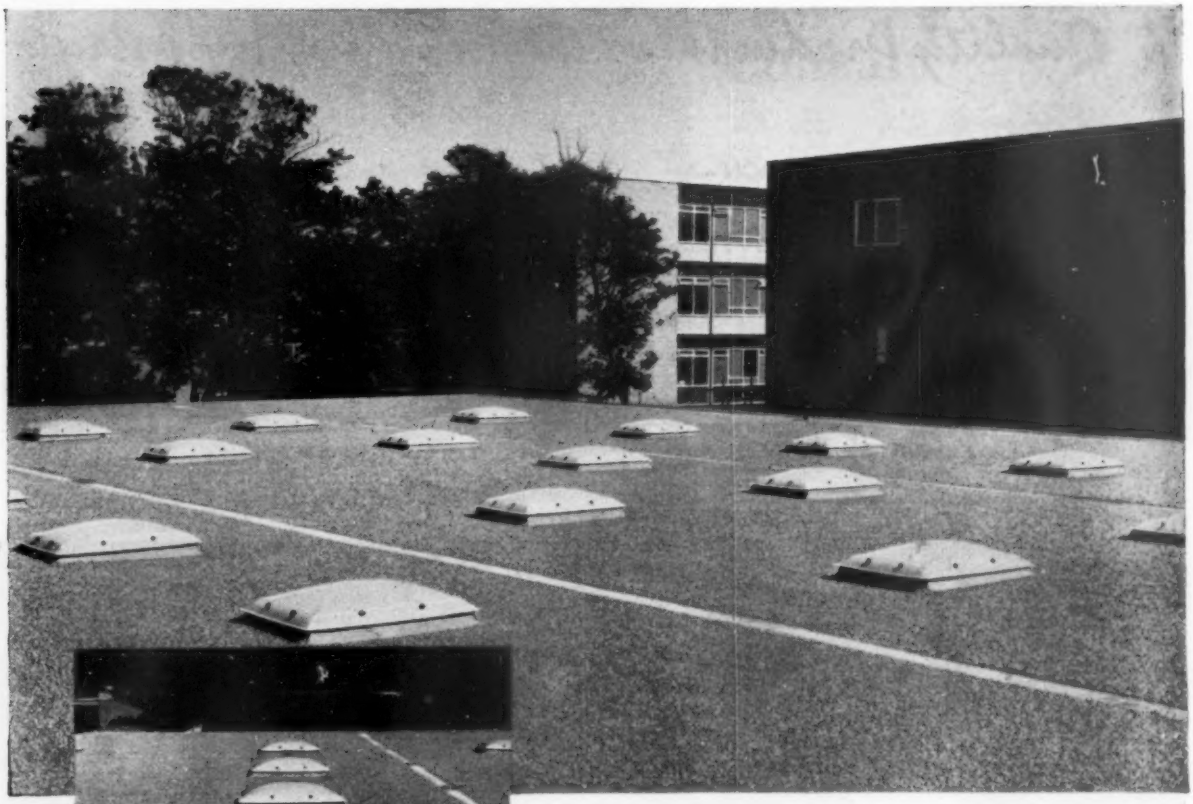

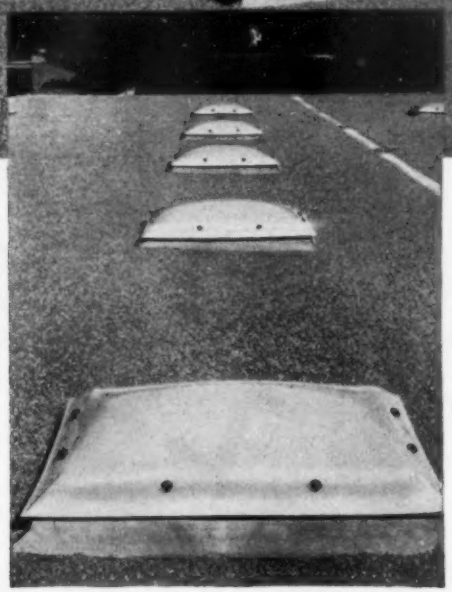

These 'Coxdomes' Mark II were made from 'Perspex' by William J. Cox (Sales) Limited, Tring, Herts and fitted on the roof of Kirkby Ruffwood County Secondary School, Rough Wood Drive, Northwood, Kirkby, nr. Liverpool.

Contractors: R. Costain & Sons (Liverpool) Limited.

Architect: C. H. Simmons Esq., County Architect for Lancashire County Council.

Because 'Perspex' I.C.I. acrylic sheet is available in clear sheet, in several diffusing opal grades and in a wide range of colours, architects may choose a variety of lighting effects. Domelights made from 'Perspex' are tough, do not corrode, and can be easily cleaned with soap and water.

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'Perspex' is the registered trade mark for the acrylic sheet manufactured by I.C.I.

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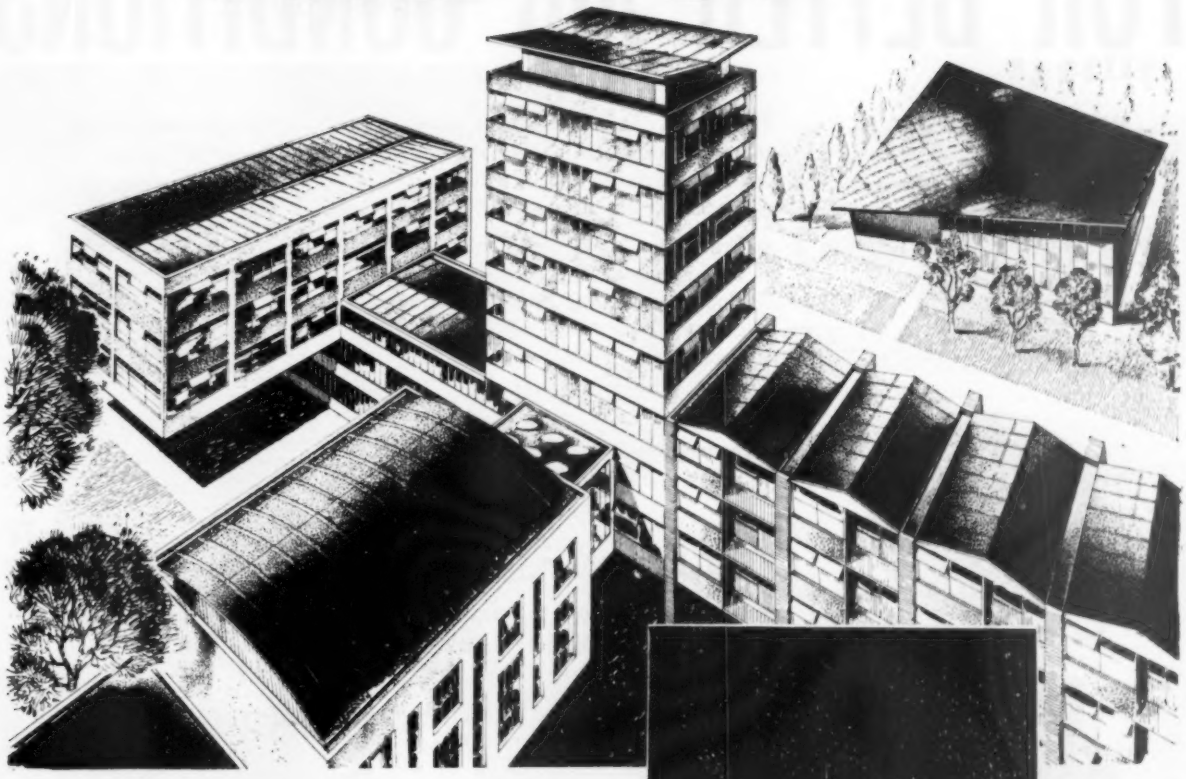

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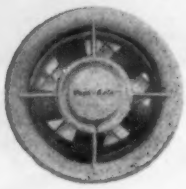
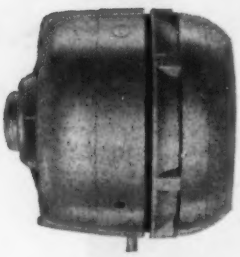


7½″


9″


12″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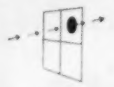

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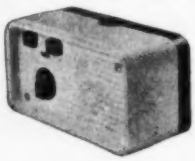
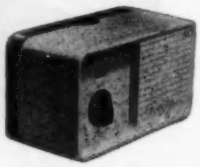
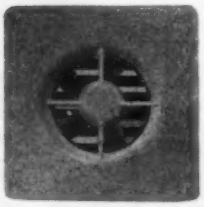
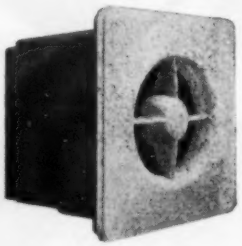
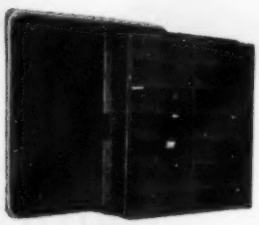



CONTROL SWITCH TYPE SD

WALL MODELS
with ivory fascia

6″


7½″


9″


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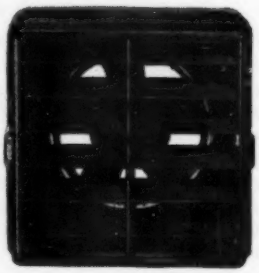

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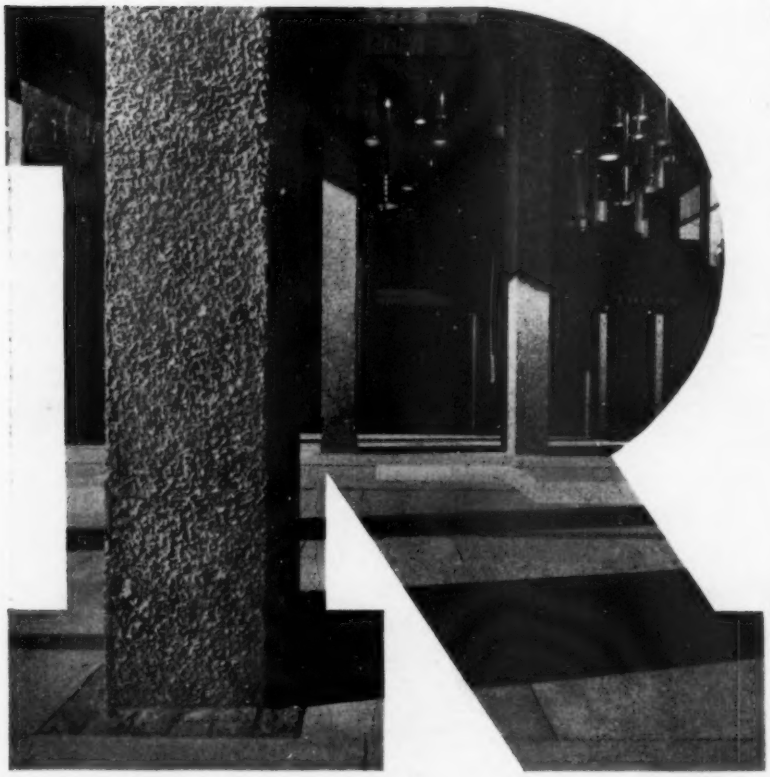

. . . specify

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Means no more weakened concrete, falling plaster or damaged pipes.

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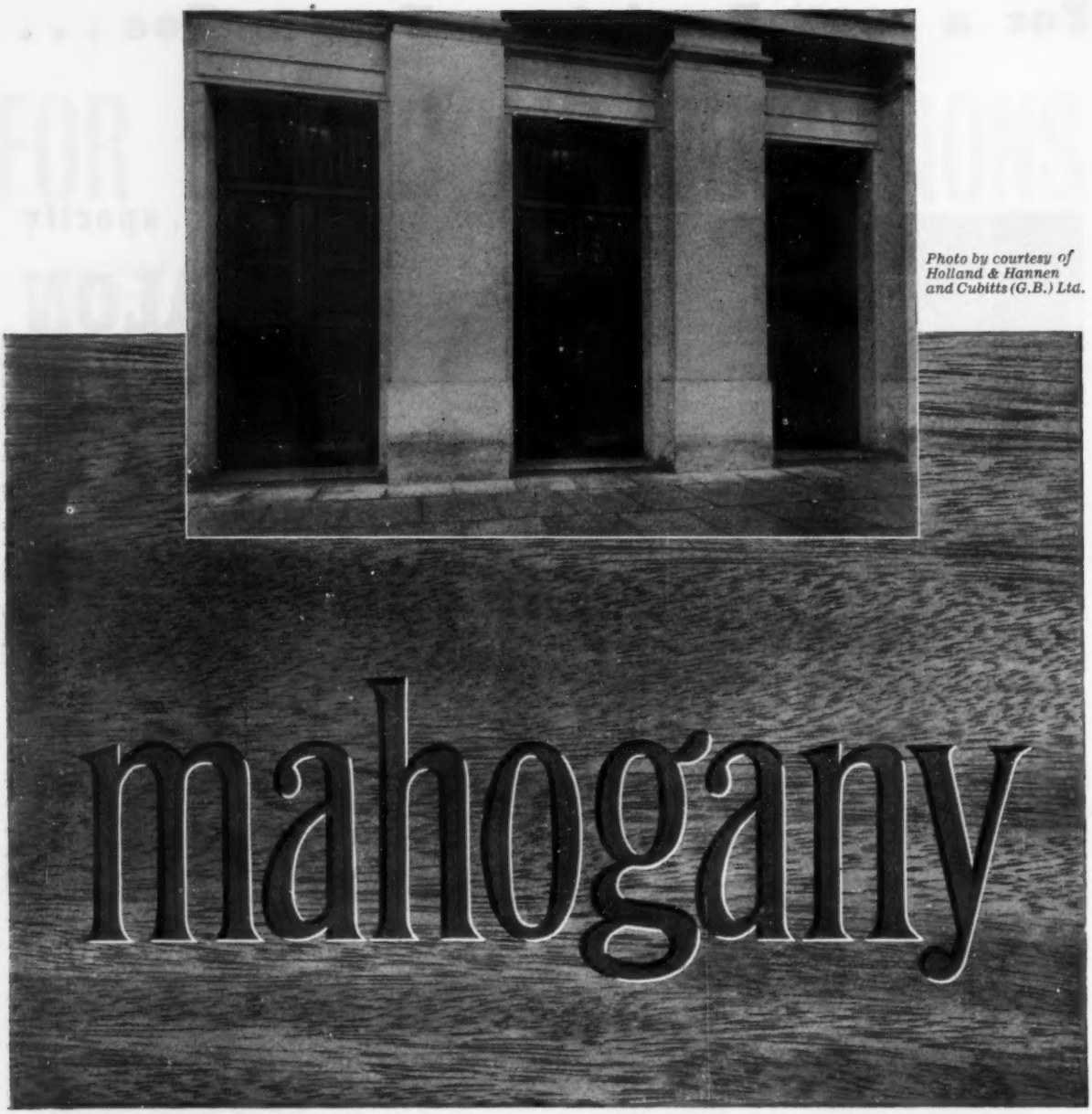

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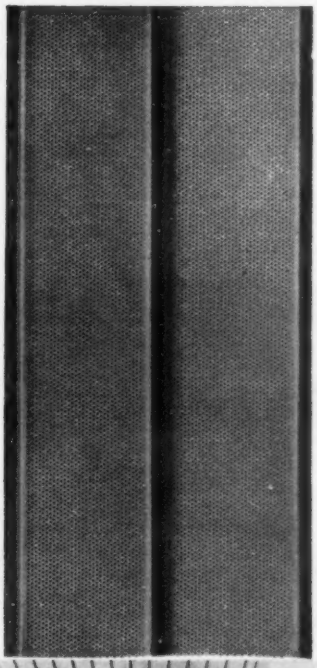

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for architects....

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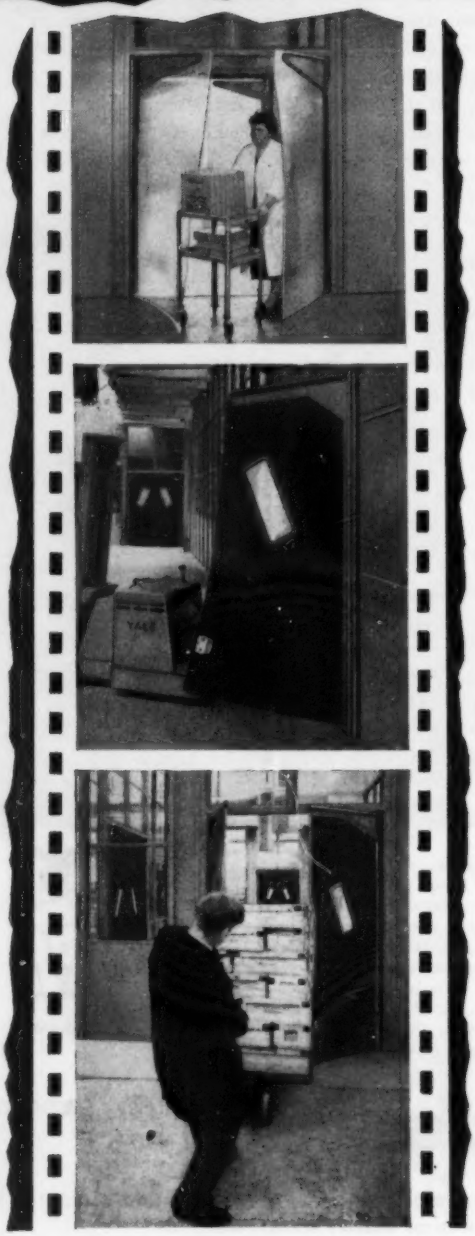

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All timber, when subjected to prolonged heat, is prone to varying degrees of expansion, shrinkage or distortion. Consequently, ordinary wood flooring tends to move considerably, gape at the joints and deteriorate in surface smoothness and appearance when laid over underfloor heating. With Alufloor, meticulous care in design and manufacture have surmounted these natural difficulties most successfully. Every piece of timber is scientifically kiln-dried to limit future expansion and contraction to the minimum. Every 18″ square Alufloor panel consists of 16 4½″ squares, each containing 5 die-squared fingers. Due to the small size of these units, cleverly set in opposing basket pattern, distortion is negligible. Movement is restricted still further by using nearly 70% of fine quarter-sawn timber in Alufloor, ensuring maximum stability. The aluminium backing permits both flexibility and cohesion. The special non-rising adhesives employed firmly fix panel to screed, yet remain pliable and unaffected by heat.

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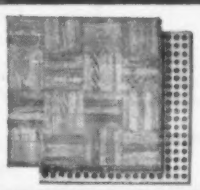

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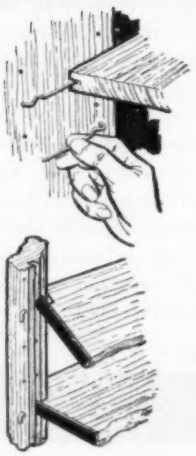

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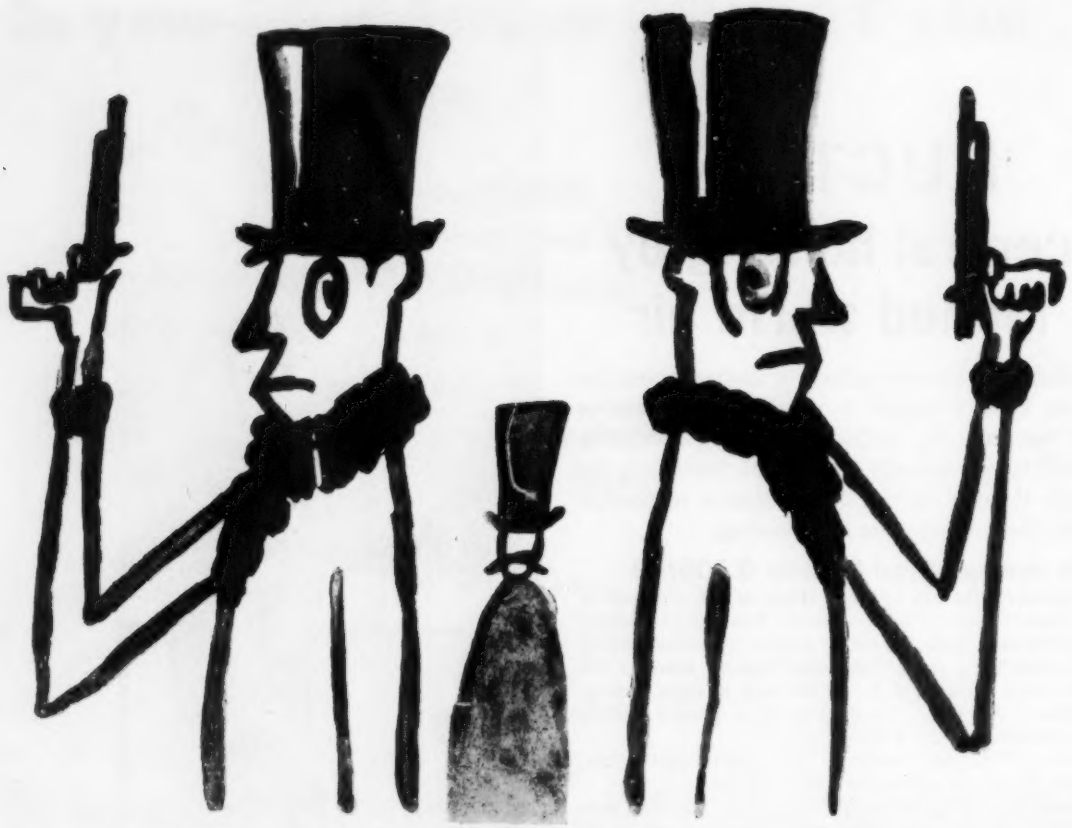

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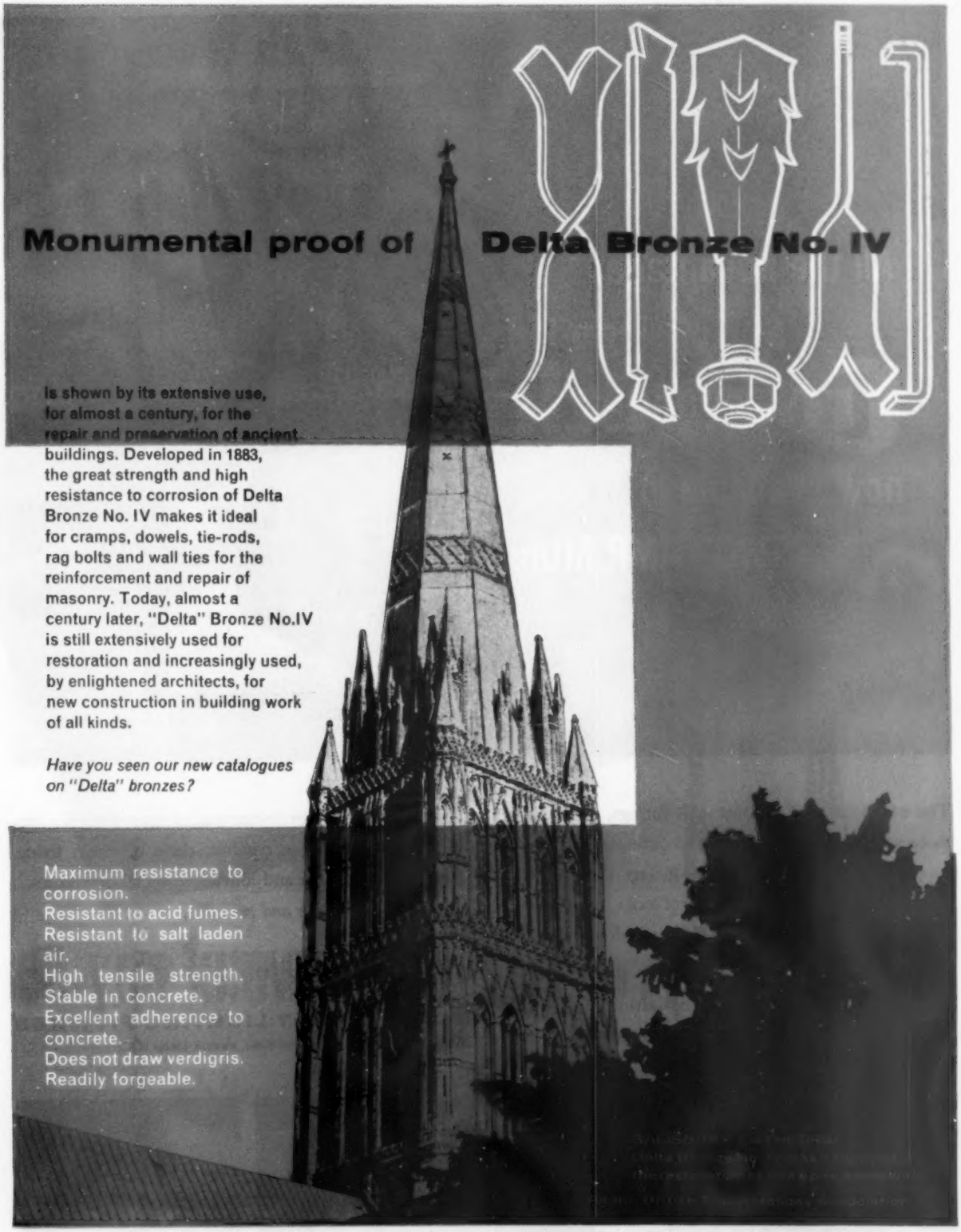

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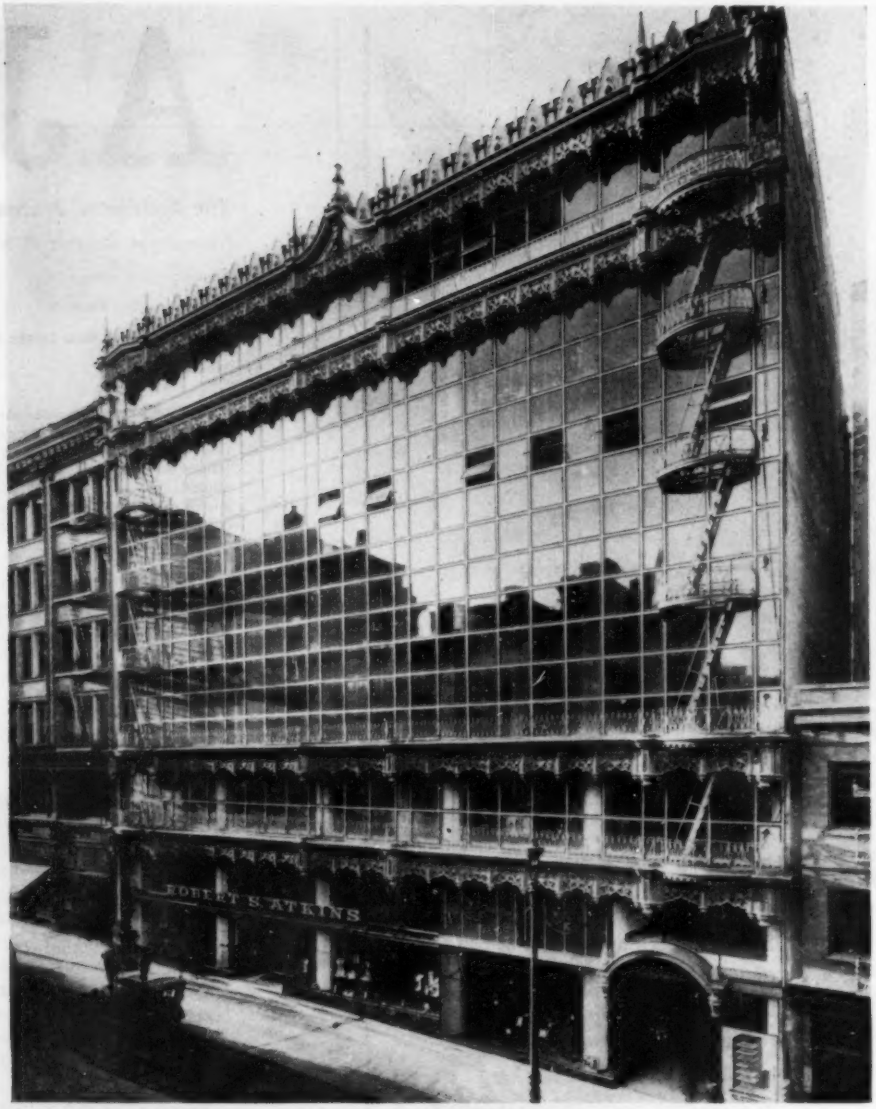
NOT QUITE ARCHITECTURE

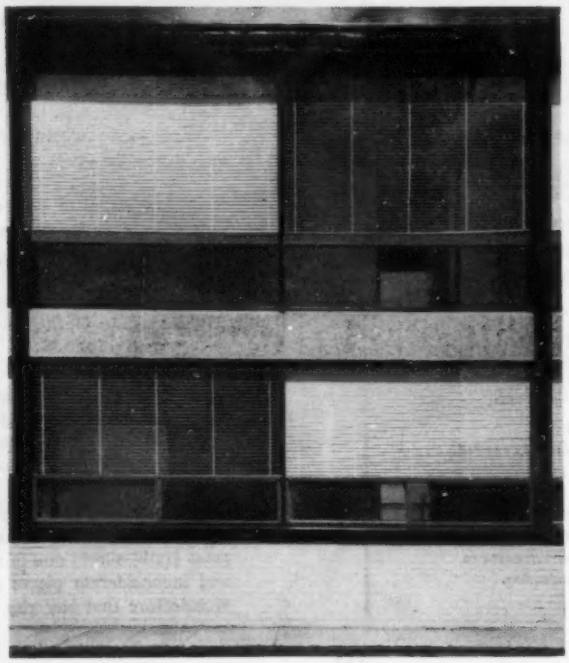
Before the tanks moved up

The taxi, by request, skirts "The Wall," stopping now and then to observe the scene. There it sits, six foot high, grey-faced, neatly topped—with true German thoroughness—with cosy red tiles. Groups of people stand and stare. Occasionally, since it is the weekend and clearly by previous arrangement—somebody on a step-ladder armed with field glasses waves a coloured scarf at a distant window. It is quiet, orderly and quite horrible to see, yet difficult to leave so fantastic and unbelievable a sight. Even more sinister are the windows of the border-line tenements. Behind the window boxes (still geranium'd) dusty glass and curtains (still hanging), the wall continues its blind grey progress. Occasionally high up a window—(a trustworthy Party member?)—stands open, as if to prove it's all a game really.

It is impossible to believe that a body of resolute citizens from either side could not impatiently brush aside the whole repellent absurdity—yet who—in any country—even one less respectful of authority than Germany—would do so? No wonder we read daily of yet another country where a dozen determined men with an agreed objective have, by taking certain key points, taken over control of one entire country.

Next morning a drive round West Berlin—the Hansa quarter, site of recent international architectural housing exhibition, now maturing and landscaped. The Congress Hall—surely one of the most vulgar and inconsiderate pieces of presentation architecture that any city could dread to





Glass in Architecture

Glass, as it is used today and was used yesterday, exemplified by the Hallidie Building, San Francisco, designed by Willis Polk in 1918 (above), and by laboratories at Duxford, designed by Philip Dowson of Ove Arup and Partners, in 1959 (below). Two of the 500 illustrations which illuminate the new, revised edition of *Glass in Architecture and Decoration*, published this week by the Architectural Press, and reviewed on p. 879.

receive: the Brandenburg Gate deserted and barrier'd, the Russian War Memorial—a Soviet-guarded oasis protected from sightseers by barbed wire and British sentries: the roofless Reichstag topped by an Army O.P. overlooking the Eastern Zone: the Hilton-dominated Zoo: the Eiermann Church still behind its hoarding—lunch among the lawns and lakes, the tennis courts and Labradors of British H.Q. Gatow, and thence to the just opened Opera House. The architect, Fritz Bornemann—young, blue-eyed and justifiably dancing with pride—is the guide. First the stage area—cathedral scale ramps, lifts, turntables, trolleys. The auditorium—no plush or pomp—just plain grey-blue wood from floor to ceiling, golden seats, a dark ceiling against which polished glass saucers float like bubbles. The foyer—huge, openly planned, great cubes of silent impressive space, colours, grey white, black. A few pieces of sculpture (among them Henry Moore and Kenneth Armitage), a flaring abstract by Nay and some brightly coloured settees. Back later that evening to a rapturously received "Aida" . . . Next morning, before leaving, a quick tour in an Army car of the central Eastern Sector. Perfunctory check at the one official entry, a zig-zag through the obstructions (no chance of a bash-through with a lorry any more) and there we are on the other side of the moon. Plenty of new building, lots of well-kept gardens, full shop-windows, shabbier 'buses, fewer posters, more ruins, virtually no cafés, hardly any cars —our own is throughout our trip the centre of attention. Are we, after all, not from outer space? The Stalinallee —far less ugly than rumoured—looks a little seedy (some of the tile facing has fallen off) but the newer tenements, being assembled in huge prefabricated elements —including their doors and windows— are shapely and simple. Turning for home we pass Hitler's Bunker—now nothing but a low grass mound on the top of which two policemen man an observation post overlooking "The Wall."

*

Under the swinging canopy of the Tempelhof building a small jazz band in macintoshes, winklepickers and Robin Hood hats is making the roof-rivets rattle. The restaurant waiter purses his lips—"not so good," he says, "as Chris Barber . . . but not bad." Why are they there? In a few minutes comes the answer. Out of a Pan Am door emerges the polished beaming face of Louis Armstrong. The jazz group finishes in a paroxysm. Flashlights, microphones, P.R. men. He is borne away like a Queen bee in a clot of attendants. Minutes later, we too are borne away into the dusk. Below us "The Wall" is invisible, but the dim empty streets that burst suddenly into neon and fluorescence trace its path like the edge of a forest-fire.

HUGH CASSON

The Editors

A CHALLENGE TO COMPLACENCY

Are we building undue obsolescence into our new housing estates? Will they be considered sub-standard years before they are structurally unsound, like so much of the housing we have inherited? For the bulk of post-war housing, if our standard of living continues to rise, the answer is 'yes.'

The inadequacy of post war housing is not so much in space standards (though storage space, the number of garages, and space for kitchen equipment is far too low) but in low standards of heating, of insulation against sound and heat loss, and of appearance and site layout. Of these, the first three can be improved in time, if not so economically as if higher standards were incorporated in the first place. But little or nothing can be done to improve appearance and site layout and the consequent environment it creates.

It has long been obvious that, apart from a thin red line of architects (Herts, Ministry of Education, Notts, LCC) who have been in the forefront of the battle against complacency, the production of higher standards of design from the bulk of the profession depends upon the demands of a large number of really enlightened clients.

Consequently we greet the arrival on the scene of the well informed Elizabeth Layton with profound relief and publish at length the paper she delivered to the RIBA this week. Mrs Layton tells local authorities to: set aside from half to one per cent of the annual capital building programme to finance research and development; to visit, and send their officers to see, the best work at home and abroad; to appoint chief architects; to commission private architects as pace-setters; to introduce cost planning and cost control; to create more big-ordering organisations like CLASP; and to collaborate with direct labour organisations and with contractors.

This is splendid advice, but Mrs Layton should not only say it in Portland Place. Nor is her admirable book* sufficient. The Ministries of Housing and Education and the RIBA should try to persuade Mrs Layton or her disciples to speak to officialdom in every major city and every county in the country. It is difficult to see how else the nation's clients are going to have it brought home to them that so far from solving the country's housing and redevelopment problems they are crippling the future for the next generation with low standards and penny-wise, pound foolish policies.

This country's architectural achievements are so few, and consequently so conspicuous, it is amazing that they are not seized upon, copied, and improved upon by every building agency. Everyone has heard of SPAN housing, but how many rivals has it got? None. Everyone has heard of CLASP, and only now, four years after its formation, a second consortium has appeared (SCOLA). Is it complacency or jealous pride, or what that accounts for so many architects and clients doing so little with so much at stake?

* Building by Local Authorities (Allen and Unwin, 40s.)

TOP PHILISTINES TRIUMPH

There will be no surprise that Prime Minister Macmillan condemned the Euston Arch when we learn that Beeching is proposing to allow the big speculative developers to add about 3½ million square feet of office space around the site of the new station. If this is confirmed we will realise that culture and good planning must take second place to profit. Office building should be *limited* in London.

*

It is also interesting to note that the reasons against the obvious, and the cheapest, precaution—that of merely numbering and storing the stones against future eventualities—*were not given* by Macmillan.

NO COAL IN THE BATH?

The other day one of ASTRAGAL'S spies volunteered to join an AA crocodile that was being led round the Stepney and Poplar Development areas by Walter Bor, the LCC's deputy planner. He reports that on this expedition there was no sign of the legendary neurotics who rush screaming from their new flats, wild-eyed with vertigo and babbling nostalgically about the dear old slums. However, the sightseers *were* approached twice by residents: the first was an old woman who insisted on telling them how lovely everything was—"just as good as living at Southend"; the second, also a woman, was aggressive in her praise for the Clive Street point blocks. "They're beautiful," she said: "I wouldn't live in one of your rich West End estates for anything." At which the rich West Enders folded quietly into their duffle coats and silently stole away to their lodgings in Islington and Earls Court.

GLARING MISTAKES

The Illuminating Engineering Society's new Code has raised doubts among architects because it suggests an all-round increase in levels of illumination without stating why and seems to advocate permanent artificial lighting instead of daylight. Two of the big electrical firms, Atlas and GEC, have now produced manuals to help people using it in practice. The Atlas guide (25s post free) has technical articles on the theory and practice of lighting (a pity it isn't A4 size). The GEC publication (presumably a hand-out) is a more modest affair, showing examples of the new calculation methods set out in the Code. Both are admirable in the way they give very full technical information on their ranges of light fittings. GEC have gone so far as to show typical glare indices for installations using their fittings, indicating that only a few of them are suitable for the typical large installation in schools and offices. This is, in fact, the big problem facing manufacturers. Even though the Code's higher levels, plus a wider use of permanent artificial lighting, means more fittings, the stringent glare limits stipulated is forcing firms to make a thorough review of their ranges. It is a pity that some of the effort put into these manuals, and for that matter into the Code itself, could not have been drawn together into a single BSI document. Some of the doubts and confusion that architects are suffering because of the new Code could then have been avoided.

MORANDI HINTS

Riccardo Morandi, the Italian engineer, has been associated with some outstanding building work and he should, therefore, have some interesting things to say in his talk about architects at the Royal Society of Arts on November 15 (6 pm). He should be equally interesting if he talks a little about himself, because his structures in Italy and Venezuela are really superb examples of modern engineering. (His bridge over the Maracaibo Lake has spans of 279 ft at a time). Tickets for the talk are obtainable from the RSA, John Adam Street.

WHAT PRICE INTEGRITY?

F. V. Corfield, MP, told this year's Conference of the Rating and Valuation Association that bribes are sometimes offered to planning officials and committee men. Are they accepted? I've heard many rumours that they are but I've never come across any real evidence. But Mr. Corfield is right in saying that the temptations for planning officials "could be really colossal" because of the sort of pay they get.

*

I hope Mr. Corfield will go on raising objections to applications being dealt with by small authorities. The delegation of powers has been taken to absurd extremes, and I have even heard of one rural district which has virtually passed on its own delegated powers to a private architect. No wonder planning is seen as a restriction to be got around—or bribed around—and not as a positive creative process designed to make the best of a community's resources.

NOT ALL ITS POSTER BE

With the generosity that characterises all its work on special supplements *The Times* has produced a three-page series of articles on "British Posters" in return for no more than a full-page ad by the two principal poster advertising associations. "Posters," we are told, "are an integral part of modern living . . . planned to harmonise with modern architecture." That claim is made, not in an editorial note but in an advertisement. It is therefore forgivable. If a man is paying for space in a newspaper he is entitled to write nonsense in it. But there is no excuse for the stuff written by architect A. Trystan Edwards in the editorial pages. After saying that a screen of posters "has some of the essential characteristics of a wall" and is therefore "an element of architecture," he dis-

The Midland Brewing group, whose architectural department have designed this new pub in the outskirts of Birmingham, describe it as an 'experiment in design'. The theme for the interiors is taken from the name of the pub, the 'Golden Arrow', with lounges named after continental holiday resorts. This view shows the split-level garden room complete with fountain and pool, with the Kristiana lounge beyond, which has a large photo-mural of a town on the Havanger fjord. Never before has Astragal seen quite so many clichés of post-war architecture gathered together so assiduously in one interior.

cusses whether or not posters should "be exempt from the application of aesthetic standards that appertain to mural decoration such, for instance, as those relating to the harmonious relationship between the component parts, homogeneity and reposefulness." He proves his point, whatever that may be, by saying that when the British Electricity Authority commissioned several Royal Academicians to illustrate the "majestic designs of the new power stations" they sold more electricity. This, he adds, "would seem to have been due in part to the fact that posters not only conveyed a message but were highly decorative."

*

This extraordinary article is accomanied by two pictures of "before and after" treatment on a bomb site. A delightful picture of an honest derelict hole in the ground is followed by another showing the awful things that can happen to an honest hole when it is filled in and topped by a dwarf-walled garden backed by trellised advertisement screens. Somehow I got the impresсion that Auntie *Times* actually preferred the tweeness of the ad-strewn garden.

SPURRING TIMES

SPUR, the society for the promotion of urban renewal which has a galvanising prick out of all proportion to its size, held its AGM recently and showed that it was as busy as ever under the chairmanship of Lionel Brett. You will have read in last week's AJ the letter it has sent to the town clerks of all small-to-medium-sized towns advising them to ensure that profit-making developments go hand-in-hand with unprofitable but essential ventures such as car parks and open space. SPUR is now co-operating with the Cement and Concrete Association on a series of exhibitions of foreign examples of urban renewal and is also discussing with the National Institute of Social and Economic Research participation in a research project (subject undisclosed) which ASTRAGAL understands to be the most far-sighted piece of planning investigation ever undertaken. Curiosity will be satisfied shortly.

SLING SHOT

"Look for yourself . . . whatever Wolfenden says, you must walk the streets day and night . . . cities are made up of small things . . . some rooms (and *you* live in them) are an insult to the eye." No one else, of course, but Hugh Casson tears into his delighted audience with such as shrewd balance of humour and criticism. His latest talk, attended by ASTRAGAL (one, he claims, of the only two talks he knows), was delivered at the Savoy recently to a hefty crowd of well-lined men; the Executives Association of Great Britain. His subject: What to keep and what to throw away (which did not include the Euston Arch). The audience (architects' potential clients to a man) were obviously impressed.

S-f-B

Have you ordered your copy of the RIBA's SfB/UDC Building Filing Manual? As this column goes to Press ASTRAGAL has had a first brief glimpse of this essential new tool for office efficiency. The first piece of classified information to be put out by the RIBA (appropriately, Aa 1) it contains the SfB tables, instructions on classifying and an alphabetical subject index, nobly prepared and freely given by ASTRAGAL'S former colleague architect Ellen Schoendorff, of the UN Bureau of Social Affairs.

*

The idea of preclassifying trade literature takes a long time to dawn on manufacturers and advertising agents; all the more congratulations are due, therefore, to those who are preparing special informative advertisements in the AJ's Element Files. ASTRAGAL has noted several useful items already (such as Flexpipe's special adaptors for joining pitch fibre pipes to stone ware).

*

The Editors' File-this-week lark is getting a bit of a strain to some of us who are not in training for such exercise. So, bolstered by complaints from his flabbier acquaintances ASTRAGAL asked the Editors when the AJ SfB Element Design Guides would appear in handy book form. The answer is grim for the lazy: not for about three years. Reprinting it as a book will depend upon heavy checking and revising after the series is over in 1962. So, don't dodge the issue: get filing.

*

Incidentally, you are not alone. By the end of October new subscribers had increased by 2,500. If you haven't started filing yet you can still catch up if you fill in the reply-paid subscription form at the back of this AJ. Special reprints of out-of-print Element Files are being prepared for latecomers, but don't be *too* late.

ASTRAGAL

LETTERS

F. V. Wickham,
Director, Temple Tubes, Ltd

Peter Burberry, DIPARCH, ARIBA, ARSH

W. M. De Majo, FSIA

Simon G. Turner, STUDENT,
Chamberlin, Powell and Bon (Barbican)

Brian Ring,
Sir William Crawford & Partners Ltd.

Douglas Brasted

Pitch fibre pipes

SIR: While I am much impressed by the excellence of the SfB Information Section in your issue of October 4 I should like to comment on one or two statements in SfB (12) *Drainage General.*

The author of the technical study has written a masterly summary of the subject but by omission has left a wrong impression which I am sure he could not have intended. On page 568, referring to pitch fibre pipes, he writes ". . . are unsuitable for continuously running hot water or effluent containing pitch solvents." The main drains of all domestic housing estates could be said to carry "continuously running hot water" but pitch fibre pipes are undoubtedly satisfactory for such installations.

Building Research Station Digest No. 97 states they "would be unsuitable only for carrying continuously running hot water *as from laundries"* (my italics). You will agree that this is an industrial installation requiring special conditions. With regard to effluents containing pitch solvents I would point out that petrol and such materials are not allowed by law to be discharged to the public drain and pitch fibre pipes are satisfactory for use when these materials are present in considerable dilution, viz in the drainage of petrol filling stations where oil companies have assured themselves by test as to their satisfactory performance.

My company believe this matter to be of considerable importance because of the great and lasting publicity of your SfB service and I should be grateful if you would give this letter adequate publicity.

F. V. WICKHAM

EDG: Drainage

SIR: Mr Shimmin in his letter in AJ 25.10.61, quotes Section 34(1) of the Public Health Act, 1936, and in the light of this section makes an interesting point about the limitations of local authorities' powers to insist on special drainage arrangements, such as separate drains on the site for future separate sewers, or site disposal of surface water when the site is adequate and when the existing combined sewer or sewage disposal plant is inadequate.

Local authorities do call for provisions of this nature, and most architects faced with requests of this sort would be surprised to discover that the local authority had no power to enforce them—as, I suspect, would the technical staff of the authority.

The legal rights are not, however, the only aspect to be taken into account. Architects may well consider it ill advised, and not in the best interest of their clients, to ignore the wishes of a local authority. The authority itself, in imposing the special requirements, is almost certainly attempting to ensure the best possible sewage disposal service. In this case, to insist, for example, on further overloading a sewer or a sewage works with surface water, if not illegal, might well be considered anti-social.

Section 22 of the Public Health Act, 1936, does, however, empower the local authority to "prohibit the use of any public sewer . . . for the purpose of foul water drainage, or for the purpose of surface water drainage," and Section 34(3) empowers the local authority "to refuse to admit the communication to be made if it appears to them that the mode of construction . . . is such that the making of the communication would be prejudicial to their sewerage system." I have assumed, perhaps wrongly, that these sections gave the local authorities all the powers they required. It would be interesting to have a legal ruling.

PETER BURBERRY
Shoeburyness, Essex

Punch holes

SIR: The new format and system introduced for THE ARCHITECTS' JOURNAL will form a most valuable aid to architects and designers.

Would it be possible for you to take it a step further and arrange to provide future issues already pre-punched, at least on the SfB pages? This would be most helpful, speed up and simplify filing and ensure that all pages always fit properly in the file; a thing which does not always happen if one has to hand punch them individually.

W. M. DE MAJO
London SW3

SIR: We would like to second Mr J. Maden's request that THE ARCHITECTS' JOURNAL as a whole should be pre-punched so that not only articles but also advertisements could be filed.

Aside from the obvious saving in time, many architects' office libraries cannot afford the financial outlay or space that would be necessary if detailed information on every product is to be stored against its possible use. Thus in many cases we have found it easier to file the advertisements.

Furthermore this office subscribes to two copies of the AJ to ensure that we have at least one copy of the AJ unbroken. Storage and protection of AJs prior to binding would be facilitated if they could be kept in ringed binders.

For the above reasons we believe the practical advantages will offset objections arising from holes which might occur in full-page illustrations.

SIMON G. TURNER
London EC1

We would like to learn the views of advertisers on Mr. Turner's suggestion.—THE EDITORS.

AJ Products file

SIR: I would refer to the entry in SfB (15) relating to screen wall units issued in the Products File in AJ 18.10.61. I cannot help feeling there must have been an error in layout in the preparation of this file, since it is quite impossible to file it in the card index without folding it in two. This in itself would not have been too bad except that, as the product is presented, any fold must come right through the centre of the illustration.

Surely it would be better policy to keep to the standard if it is to be used at all rather than comply so wholeheartedly with the exigencies of the layout man.

BRIAN RING
London W1

Our apologies: in future we intend to keep as far as possible to A6 size, or illustrations without the fold.—THE EDITORS.

SfB

SIR: As a devotee of ASTRAGAL—yes, even to liking the punning!—may I implore you to use your influence to anglicise the Swedish "Samarbetskomitten for Byggnadsfrago"—SfB (literally, the collaboration committee for building questions)? Otherwise a good idea could be spoiled by a meaningless title.

There is some excuse for the Swedes' using English terms, as they have a small, limited vocabulary, but English has a rich, wide and fine technical vocabulary.

DOUGLAS BRASTED
London N4

What about System for Building?—ASTRAGAL.

NEWS

NEW STRATEGIES FOR LOCAL AUTHORITY BUILDING

Elizabeth Layton at the RIBA

Elizabeth Layton in a stimulating paper at the RIBA on November 7 set herself to "prick the skin of what Professor J. K. Galbraith has called 'conventional wisdom'—ie, what is acceptable through being familiar. "Such ideas have a high degree of stability and are difficult to change," she said, "my task tonight is to suggest how new ideas can be introduced and in their turn made acceptable."

Pointing out the importance of local authority building, which is responsible for £400,000,000 a year being spent on capital building projects—"not only a sizeable proportion of the national building effort, but both the costs and the benefits affect the whole community—"If this were a sermon," said Mrs Layton, "and I had to choose a text it would be from Professor Arnold Toynbee's *Study of Civilisation*,† in which he elaborates his idea that the rise and fall of civilisations depends on the interaction of challenge and response. . . . In the very practical field of local government I shall be concerned with how to provoke the challenge and how to evoke a lively response." The challenge was to complacency, narrowness and the acceptance of conventional wisdom and "the humdrum."

"If the challenge is vigorous and the response lively we can expect great improvements in the quality of local authority building without correspondent increases in costs. We can also look forward to much closer co-operation between users and designers and between designers and builders. I believe that the whole building industry is bogged down with old-fashioned ideas about organisation and low standards of design and execution. I believe that local authorities could make a very valuable contribution to draining this bog," she said.

Summarising the role of central government, Mrs Layton described it as having political, controlling and stimulating functions, and of the first she remarked, "It is deeply disappointing that the latest economic crisis has once again resulted in a cut in local authority building programmes. The recurrent stops and restarts have had a most damaging effect on the efficient organisation of building work—much more damaging to efficiency and cost-control than the actual reductions in building activity achieved at each crisis." The controlling functions of government, she remarked, varied greatly in scope and effectiveness between one service and another, and she commended to all Government departments "the three main instruments of control used by the Ministry of Education: long-term programmes, three years ahead; minimum published standards and clear cost limits." Within the floor, walls and ceiling of this control LEAs have great freedom to plan their schools as they wish. Built into this system is the incentive to get value for money."

She cited the MOE again as the best example of the stimulating functions of government. "I regard the methods of the Development Group as used by the Ministry of Education as the most exciting thing which has been done about building on the Government side," she said. "I hope that equally fine achievements will come from the new Development Groups in the Ministries of Housing and Health. The MOE has given a real challenge and the response of the LEAs exactly illustrates my main argument." She doubted, however, whether development work in the fullest sense could be carried on outside Government departments with the possible exception of such large local authorities as the LCC. Local authorities could, however, do valuable research work on a smaller scale.

Turning to the objectives of local authority building, Mrs Layton described them as being "to produce buildings which are functionally suited to their purpose, to get value for money, and to build buildings which are beautiful or at least pleasing. I am afraid I regard a great deal of local authority building as drearily dull," she said, and sometimes it was downright poor in functional design. "Much of it, in spite of all the fuss about costs, gives less good value for money than it ought, because the savings are made on the wrong things."

"I expressed some misgiving about the extension of development groups to local authorities," she went on. "This kind of work is in danger of becoming fashionable without a realisation of the scale, quality or cost of the work involved. But I am 100 per cent in favour of every local authority doing some original research work of its own." Every authority, she suggested, should spend a ½ to 1 per cent of its annual capital expenditure on research. If they did this three benefits would accrue: the building industry is backward because far too little is spent on research, the very fact of doing research acts as a stimulus, and the resulting buildings would be better value for money. It was not enough to test materials for maintenance, much more research was needed into user needs and the design of buildings, and into more efficient methods of building on the site.

CLASP, she pointed out, devotes ¼ per cent of its capital programme to development work, and she hopes this proportion would increase. Authorities with direct labour organisations had "a wonderful instrument for experiment in their hands, but they are almost totally failing to use these opportunities," although the LCC had recently begun to experiment with new building methods using its direct labour force.

Mrs Layton went on to urge the great value of visits between local authorities to see each other's best work. "The ratepayers' money is well spent on members' and officers' visits to see the best work being done elsewhere," she said. "I believe this has a really stimulating effect and is a good corrective to complacency." Yet many local authorities were "very sticky" about allowing their staff to take a day off routine for this purpose.

Turning to the use local authorities make of architects, Mrs Layton commented that there was hardly any need to stress the importance of having a chief architect in charge where the volume of work justified it. "Frankly I do not see how any large or largish authority can hope to build successfully without putting architectural design into the hands of a chief architect," she said. "You cannot hope to attract an able man to a subordinate post. And you cannot attract the pert young architects unless they can expect the man at the top to talk the same language. Ability steps into places where there is most scope."

She was astonished, she went on, at the strength of feeling against the use of private architects except for prestige buildings, revealed by the RIBA Inquiry. Councils had said they only used private architects under the compulsion of staff shortage, and that they did not find that private architects increased output. What were the causes of the difficulties between local authorities and private architects? "To be brutal," she said, "there are a great many unbusinesslike private architects who are incompetent about keeping to time-tables and cost targets. But equally there are far too many authorities who ask the impossible of their private architects. To solve their own bottlenecks they offer impossible programme schedules," poor briefs and expect too much knowledge of procedures. The private architect had a more constructive function than to stop gaps or build an occasional town hall, the most important, "to introduce new ideas, to challenge the conventional wisdom, to stimulate the official architects to give of their best, and to help break the dreary monotony of repetitive design." Yet very few local authorities used them for this purpose. She went on to quote, as worthy exceptions, the LCC at Roehampton, new towns like Basildon, Harlow and Stevenage, and summed up by saying, "I commend the use of able private architects to undertake a regular proportion of each authority's work, particularly as one solution to the problem of dullness."

Costs and value for money, Mrs Layton continued, "should be regarded as a challenge, not a wet blanket," as at the MOE. But "it is only possible to get value for money if authorities insist on cost planning from the earliest stages of design and get the quantity surveyors, official or private, working with the architects from the outset. Authorities who bring in the QS when the design work is nearly complete will never get their costs under proper control. Half the economies made just before going to tender, and half the subsequent headaches on maintenance, are due to unsystematic methods of designing without continuous control of costs."

Mrs Layton said she regarded CLASP as "the most important new form of building development among local authorities" and was delighted at the establishment of a second Consortium, SCOLA. "I am hoping desperately that some *housing* authority will now take a further initiative and do the same sort of thing for housing programmes" she said: CLASP had to some extent been a response to the challenge of the MOE's development work; she hoped the MOHLG's group would produce a similar challenge and response. Thanks to CLASP "at long last there is a client organisation among local authorities which sees the potential ties of co-operation with the producers. Would housing authorities, please, follow suit?"

This led her straight to her final point, co-operation with the contractor. "The gulf which now divides the builder from the architect and his clients, the idea that the contractor begins where the architect ends, is responsible for much of the inefficiency of the building industry," she said.

"Architects are far too little aware of the production problems of the builder on the site, of the costs in terms of site labour of minor variations in their designs, or of the economies to be derived from designs and specifications which allow the continuous, consecutive and economical use of heavy plant.

"Similarly contractors are accustomed to accept the architect's peculiarities and possible inefficiencies without demur and to secure appropriate cover in the tender price. This is a ludicrous division of function.

"One of the best challenges to architect and contractor alike is for authorities to set aside their standing orders from time to time and to allow architect and contractor to work together on schemes which end with negotiated contracts."

She cited the LCC's Picton Street, Birmingham's Millpool Flats, and Amersham school as three rare samples of co-operation of a kind that ought to be going on all over the country every year.

Much more collaboration with contractors, and with direct labour organisations, could be perhaps the most important of all the possible means of improvement to secure more efficient and cheaper building.

TCPA CONFERENCE

Inquiry into planning

Britain's entry into the Common Market —even without a Channel bridge or tunnel—would be bound to enhance the advantages of a south-eastern location for industry and commerce, and therefore to strengthen the drift of population from the North and West. At the same time, rising standards of living and increased mobility will intensify the much larger movement of people (but not of jobs) from congested centres and rural backwaters to the outer rings of city-regions in every part of the country. What should planners try to do about these cross-currents, and what changes in the machinery of planning are needed to enable them to do it?

These were the main themes of the Town and Country Planning Association's "Inquiry into Planning," held in London on October 25 and 26. But before it got down to them, the conference heard from the new Minister of Housing and Local Government, Dr. Charles Hill, that in the 10 days that had passed since his appointment he had become aware of the problems before him, and was prepared to say the right things about them —notably about green belts ("Make no mistake: they are here to stay"), urban renewal and the need for research, experiment and a reconsideration of methods and standards. What he may be expected to do about them, however, depends entirely on how much weight was meant to be given to his concluding qualification: "I for my part must take account also of the realities of politics, of the difficulties for planning inherent in a free economy, of national economic priorities, and of the strength of local government tradition." An ominously formidable barrage of excuses for inaction, if he should need them.

Professor Michael Wise, of the London School of Economics, outlined a geographer's view of the situation. The fundamental point which must never be overlooked in planning, he said, was the interdependence of our regional economies. Another basic element was our scarcity of land in relation to the demands for it, a third the importance of location, and a fourth the incessant change in locational values. The planner's task, as he saw it, was to assist and ease the adaptation of the pattern of land uses to new conditions, so as to provide an efficient environment for economic activity and a satisfying environment for social life.

We must correct the fatal error of the Barlow Commission—to assume that the existing pattern of industrial regions could be preserved in a static form. We must help the process of its adaptation to take place as swiftly and smoothly as possible, with a minimum of disturbance to the national economy and to the freedom and welfare of individuals. We must also rid ourselves of the notion that there was something inherently evil in the great concentrations of employment on which our economic efficiency depended. Planners must encourage and shape the growth of these city-regions (they had passed the stage of "conurbation") against a green background of land for leisure as well as agriculture. This process must include residential provision for city-centre service workers in the outer areas of expanding city-regions and the building up of locationally attractive growing points in the declining regions.

Our present industrial location policy, he argued, was attempting to achieve two objects at the same time—to steer industry to declining regions and to assist dispersal from congested centres in all regions—and the Government had failed in its duty to make clear the priorities that were being observed. The time was ripe for a new statement of national aims.

Taking up this challenge, J. R. James, chief planner at the Ministry of Housing and Local Government, said that while it was unrealistic to suppose that we could halt the growth of Greater London and the West Midlands, he personally believed we must continue, for social reasons, to do as much as we could to soften the adversities of the declining regions by the use of controls to offset their locational disadvantages. He thought these areas should have first claim to any industry that was on the move. In some of them we could not hope to resuscitate existing industries, but our first aim must be to sustain the local economy until these industries had declined to a level at which they could be efficient and stable, and until the population had adjusted itself to that level. Our second aim must be to ease employment out of the congested centres; any firm that satisfied the Board of Trade that it could not leave a city-region because of economic ties should be subjected to a stringent second test of its capacity to move beyond the green belt. We must accept the facts of life as a basis, Mr James concluded, but our policies should seek to alleviate their unhappy consequences.

Mr. G. Grenfell Baines, planning consultant, wanted the Government neither to assist nor to palliate the southward drift, but actively to resist it by promoting regional self-sufficiency through "industrial associations," on the lines of housing associations, financed by insurance companies in partnership with the Treasury. Professor Wise in reply insisted that inevitable changes must make the regions ever more inter-dependent, and that to try to keep the present pattern would be to court disaster. It appeared, however, that his only difference from

Mr James was that he bracketed economic efficiency equally with social welfare as a necessary objective of the planner's efforts to regulate the process of change in the distribution of homes and workplaces.

Like Professor Wise, Sir Edwin Herbert (who was chairman of the Royal Commission on Local Government in Greater London) deprecated our conservative habit of retaining the same old words for changing institutions and fondly believing they still bore their original meanings.

Planning was now inextricably mixed up with housing, traffic management, highway construction, the development of port facilities, the movement of population, the distribution of industry, the development of electricity and even the balance of payments, and in some parts of the country it involved regional considerations that went far beyond the borders of any one county council. In order to secure Ministerial confirmation, each of the 10 development plans for the Greater London area had had to conform with the Abercrombie plan, but each would have been different in important respects if it had initially formed part of a regional development plan. Moreover, there was no means of repeating the Abercrombie exercise now that its assumptions were in urgent need of revision, for the Minister was debarred from doing so by the 1947 Act: and none of the planning authorities which that Act set up was in a position to do anything similar.

"I do not believe," said Sir Edwin, "that this power vacuum can continue much longer. I do not disguise my opinion that in London, and possibly in certain other parts of the country, some form of regional planning machinery within the local government machinery will have to be found."

Peter Self, chairman of executive of the TCPA, aligned himself with the resisters of the southward drift on the grounds that it was going to be a Herculean task to plan the South-east for the people who were already there, that it was wrong to put all our economic eggs in one or two baskets, and that we must not overlook the greater cultural contribution that could flow from a vigorous regional life. The Local Employment Act, he pointed out, was a bagatelle compared with the total volume of Government investment, and more Government money might be better spent on making Durham a better county to live and work in than on meeting the social costs of allowing continued migration from Durham to London. He was sure it would be perfectly possible to get more diffusion of economic activity and growth in modern Britain if only Government help were concentrated on potential growing points in each region, rather than on localities which happened to have above-average unemployment, and if in each region there was a public agency concerned with that region's general economic and social development.

Assuming that the creation of regional authorities by a reform of local government was out of the question, Mr Self suggested the setting up of regional development corporations to act as vehicles of Government industrial aid, in place of the "miserably parochial" Local Employment Act, with powers to provide supplementary services and housing within the framework of master plans jointly prepared by the local planning authorities of each region. At the same time he would impose a tax on the employment in London of office staffs in excess of a certain size, to meet the costs which an excess of office employment imposed on the public purse. A restrictive green belt policy, he went on, would certainly not work on its own. If the outward growth of large conurbations was to be checked, space must be found for urban development elsewhere. Meanwhile the redevelopment of blighted areas must be tackled on a larger scale.

To make these suggestions feasible, Mr Self advocated the setting up of a new Ministry of Development and Land, responsible for physical planning in the same way as the Treasury is now responsible for economic planning. This Ministry would bring together the planning of transport and communications, housing, industrial location, the conservation of natural resources and the preservation of rural areas and national parks.

A more "radical" approach to the problem of Greater London came from P. A. Macrory, chairman of the FBI's Location of Industry Committee, who wanted a sort of Brasilia for Britain, located far from her commercial capital, London.

DEREK SENIOR

TPI

At the cross roads in the motor age

Living with the motor car was very much the dominant theme of John G. Jefferson's presidential address to last week's general meeting of the Town Planning Institute: what policy should be adopted towards coping with the car, in movement and at rest? The question was fundamental to every problem of our environment, from high density housing, bungalows proliferating along our south-east coast to central area redevelopment, and the protection of the countryside, and the importance of planners solving these problems finally brought Mr Jefferson to suggest that root and branches changes might be needed at the TPI itself.

Mr Jefferson admitted in opening his address to a lot of sympathy with Sir Frederic Osborn in his preference for low density bungalows to high blocks of flats, remarking that "the people who are migrating into west Sussex nearly all want to live in bungalows. It may be that land in the south-east of England is so scarce in relation to the demand that we simply cannot afford to allow any more low density development. But it is no use pretending that these people should prefer flats or terraced houses because of their aesthetic qualities or for sociological reasons. The detached house or bungalow has become a status symbol not only in America but in this country and we cannot overlook this phenomenon." He thought, however, that imaginative layout and proper landscaping were as important in a housing estate as the architecture of the dwellings—"but in practice seem amazingly difficult to secure."

Turning to central area re-development—"the professional planner's main preoccupation"—Mr Jefferson remarked that the Institute's Memorandum to the MOHLG on Central Area Development last May, and this year's follow-up memorandum on Procedure for Comprehensive Area Development (AJ, 11.5.61) had "aroused no very great enthusiasm," but he thought it had provoked discussion. "But many of the questions still remain unanswered—compensation for planning blight, the working relationship between county council and district council and between private enterprise and public building—the co-operation of Chambers of Trade and similar organisations, and by no means

least, the support of the general public."

Mr Jefferson went on to consider the particular problem of the statutory procedure for redevelopment which would take proper account of the third dimension. "I have often wondered how this criticism can be met," he confessed. "The town planner can prepare models and perspective drawings of what he has in mind, showing how the designs for several parts of the area may be properly related in three dimensions; but it is acutely difficult, not to say impossible, to incorporate these designs into the statutory document which eventually receives the Minister's approval." If the developing authority owned the land the problem was relatively simple, but where large areas were privately owned no one had yet suggested a practical solution. Town centres followed naturally from this consideration, and Mr Jefferson referred to the American view that town centres "are dead or decaying and it is a fallacy to try to renew them."

"Are we to base our plans on making provision on a realistic scale for the very thing that is killing our city centres (the motor vehicle), or are we to plan for centres from which the motor vehicle, some way or another, will be excluded?" he asked. "Will the new plans for our town centres cater for an increase in road traffic on the scale forecast by the Road Research Laboratory? One might exclaim 'Heaven forbid!'—yet what is the alternative?" He agreed with Colin Buchanan's thinking on this question (expressed in his Rees Jeffreys lecture the previous week): "It may be that in the future we *must* accept some form of prohibition for the entry of *all* cars to parts of our town centres, and even—dare I say it?—to some parts of our coast; but there is no hint at present that such a policy will be acceptable, and can we honestly base our plans on such a premise?"

Turning to the pressure of building and of motor cars on the countryside, Mr Jefferson described the situation in his own west Sussex village, where 4,000 cars park every fine Sunday and by lunch time a stream of further cars has to be diverted eastwards. He went on to consider related problems of the countryside. "Rural planning is bedevilled by land values which have risen sharply—so sharply that parish councils, for example, are not prepared to face the cost of providing a village playing field within the village area and housing authorities are jibbing at paying building land prices for land for council housing." Mr Jefferson denied, however, that making more land available would reduce prices appreciably. "It is doubtful whether it would be possible, let alone desirable, to release sufficient land to make any substantial impact on prices," he said. "There can be no doubt that many of the problems of land use planning stem from the fact that the present arrangements for compensation and betterment are far from satisfactory."

Finally Mr Jefferson turned to public relations and the future of the TPI itself. If planners were to make the necessary impact on public and public authorities alike, they had to improve their relations with the press and the BBC, to work to increase the prestige of the profession, so that "whatever committees or working parties are set up to study problems of land use . . . or prepare schemes for development, . . . the first person to be approached is the chartered town planner—yet sometimes he is omitted altogether!" He thought they could only achieve the position of authority that town planners have in America (wherever planning laws exist!) by recruiting and training more people, and aim for the TPI "to take its rightful place by the side of other professional institutions." The TPI, he said, would have to choose between "being small and exclusive or enlarging its ranks": could this be done by allowing a greater degree of specialisation in the examinations of the Institute, so that all members did not have to be designers? A sub-committee of the Council had already started to work on this problem, which might involve fundamental changes, such as a revision of the examination syllabus and modifications of present requirements for training and experience.

SWEDEN

Housing construction methods

The Skarne systems of housing construction in Sweden were described in a lecture by Mr Bengt Axelson to a gathering of architects and engineers on October 23 at the RIBA—and was the subject of last week's frontispiece in the AJ (1.11.61), the particular scheme shown being designed by Lindström, Byden, Arell Vattenbyggnadsbyrån, of Stockholm.

Three basic systems were illustrated showing various degrees of prefabrication. The first, already familiar to readers, was the scheme in which the core of the building is carried up continuously by sliding formwork carrying the tower crane inside a lift shaft, the further operations being a combination of in-situ and small precast members both structural and cladding. The other two systems related to much larger panels and only differed in the type of crane used for construction. The more interesting of these employed a Goliath type crane straddling the four or five-storey building and handling both vertical and horizontal units of room size. The units were factory made and transported up to 50 miles. The crane was able to move forward leaving behind it individual flats, the structures of which were completed in about 16 days per flat. Fittings such as baths, toilets, etc, were pre-packaged in protected crates and lifted on to each flat level as the work proceeded.

Systems such as the Skarne system are in use in a number of continental countries and Mr Axelson answered some questions which were obviously aimed at finding out why no such factory prefabrication system was in operation in this country. One rather suspected from the answers that on first cost the systems could not compete with traditional building and could only be justified on an overall economy depending on a combination of speed of completion, land costs, finance, etc, thus leaving the potential contractor with a problem of either obtaining Ministry or local authority backing or, alternatively, being given a guarantee of continuity.

BUILDING CENTRE

Opening of brick library

On October 30, P. J. Grover, chairman of the Brick Publicity and Trade Development Committee of the National Federation of Clay Industries, opened the new Brick Library at the Building Centre, which is reported to have taken four years to complete.

This is a permanent collection of facing bricks, which are arranged in panels on the shelves, each panel being two courses high and two stretchers wide. The bricks are arranged according to regions and visitors can inquire at the information desk to find the annual production, the approximate price and the addresses of a number of buildings on which the bricks have been used.

The library when complete (it still has quite a long way to go) will include some thousand entries. It is already a useful visual reference.

COMPETITION

Design in plastics

The British Plastics Federation is again organising a competition on behalf of the Worshipful Company of Horners to encourage young craftsmen to produce good designs in plastics: an award of 100 guineas is being offered for the most striking design for an article suitable for commercial production wholly or mainly of plastics.

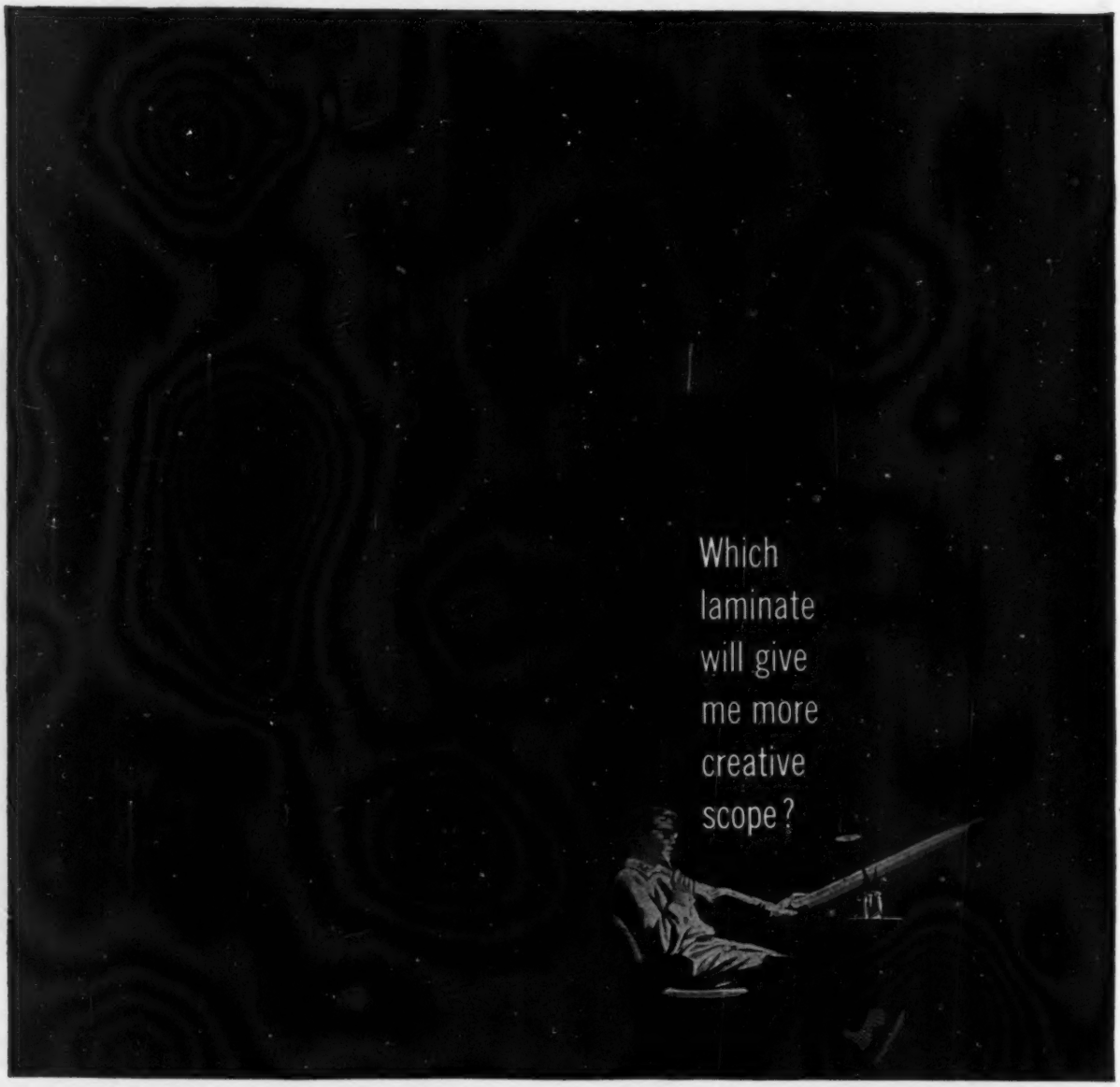
The competition is open to designers in the United Kingdom who are under 35 on December 1 1961, the closing date for this year's entries.

Copies of the regulations and entry forms are available from the British Plastics Federation, 47-48 Piccadilly, London, w1, to whom entries should also be sent.

Correction

We wish to apologise for incorrectly describing Robert Haynes, author of the EDG and Technical Study for section (15) *Garden: Fences, gates, walls* (AJ 1.11.61), as deputy county architect with Buckingham County Council (chief architect and planner Frederick Pooley, FRIBA, FRICS, AMTPI).

Robert Haynes is in fact an assistant county architect.



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AJ. 21

REVIEW

A history of glass

Glass in Architecture and Decoration *by Raymond McGrath, A. C. Frost and H. E. Beckett (Architectural Press, £6 6s)*

"The infinite capacity of mankind for taking things for granted has never quite succeeded in the case of glass. That a solid should also be transparent is sufficiently contrary to general experience to make it at least a degree less prosaic than most other materials in common use. Custom may have staled the mystification with which it was at one time regarded, but the fact remains that of all manufactured materials glass appeals to that fantastic side of man's nature which selects such and such a thing as delightful in itself and makes it part of his poetic stock in trade."

So began the preface to the first edition of this monumental book by Raymond McGrath and A. C. Frost. Since then, the visual variety of glass has not ceased to delight nor has its seemingly infinite store of technical accomplishments been exhausted. Indeed the use of glass in building is continually increasing owing to a wider appreciation of its qualities, to technological advances in manufacture and to the fruits of constant research, so a new edition of what has become the standard textbook is long overdue and most welcome.

The first edition, published in 1937 and long out of print, set a pattern which has remained unchanged in the present edition, although it has been thoroughly revised and reset. The book's five sections fall naturally into three main parts devoted to the making, the use and the nature and fixing of glass. The first part traces the history of glass making from ancient times to the present and includes a description of the manufacture of float glass and a new section on glass fibres.

A seemingly arbitrary division into "Glass in Architecture" and "Glass in Decoration" is made in the second part, but, although the vulnerability of this separation was appreciated by the authors in 1937, it corresponds fairly closely to two quite distinct techniques and the break does not appear unnatural. "Glass in Architecture" briefly examines the progression from window to wall glazing and then covers in great detail the use of glass in horticulture, crystal palaces, shops and arcades. This section concludes with accounts of the development of glass and metal construction in walls and roofs, glass and concrete construction, and the use of special glasses, all of which have been reorganised and rewritten to accommodate the wide aesthetic and technical changes of the last two decades. "Glass in Decoration" opens with a quick survey of the decorative qualities of glass and then deals successively with glass mosaic, decorative glass processes and colour in glass and contains two new essays on stained glass and chandeliers and light fittings.

The final part of the book, "The Nature and Properties of Glass" by H. E. Beckett of the Department of Scientific and Industrial Research, and "The working, Glazing and Fixing of Glass," comprises a thorough and scholarly consideration of the subjects and has been virtually rewritten. It also deals in great detail with the durability, strength and hardness of glass, its transmission and reflection of heat, light and sound.

The book concludes with an appendix of British building glasses and a useful glossary and bibliography. The text contains nearly eighty line drawings and over 300 pages of photographs are distributed in groups between each section. The text is clear and neatly arranged with a wide left hand margin containing paragraph summaries which greatly facilitate its use. But one wishes that more care had been devoted to the index.

It is only comparatively recently that the antecedents of twentieth century architecture have been appreciated with any clarity. One of these was the deep rooted vernacular of frame and fill begun in the Middle Ages and continuing in the anonymous industrial architecture of the early nineteenth century. Another was the evolution of the iron frame as a means of structural support and the emergence of glass as a building material. This book performs an invaluable service by describing in vivid and absorbing detail the development of glass manufacturing processes at that time and the exploitation of glass in the early forcing houses and greenhouses, culminating in Paxton's Crystal Palace, the evolutional significance of which is now seen to be immense.

Thus far the accent of the book has been mainly historical. Since glass has been known since the Bronze Age and, as Le Corbusier has observed, the history of architecture is the history of the struggle for the window, the field is vast. The authors have, however, skilfully avoided the temptation to pursue minor and unprofitable lines of development and have concentrated on a succinct presentation of those developments in manufacture and use which have had the profoundest effect. At the same time, a certain unevenness is apparent in those fields in which the greatest changes have occurred since the first edition. For example, the manufacture of diffusers and double glazed units is nowhere described and the visual and technical problems of curtain walling receive a superficial and at times inaccurate appraisal, while large portions of the book are devoted to the now less fashionable glass and concrete construction. One suspects that this may be due in part to the author's personal preferences, since "Glass in Decoration" generally and the section on stained glass in particular receive most sympathetic treatment.

The technical sections are a model of how to assemble, collate and present technical information for the architect. They include much recent research and data from a multitude of widely scattered sources and such a collection and condensation of inaccessible information will be widely appreciated by practising architects. The first technical section is painstakingly annotated and includes an excellent bibliography.

There are some regrettable omissions. solar heat gain through large glazed areas has now been recognised as a problem in this country and fuller information on its exclusion would have been welcome. Again, present indications suggest that the most likely method of fixing glass in future will be with compressible extruded gaskets, but this technique receives scant consideration.

One might, perhaps, question the form in which it has been presented. Its size and weight may hinder the acceptance of the technical section as the drawing board reference book it ought to be, and it is unwieldy for enjoyable reading.

Such criticism of form does not, however, detract from the absorbing interest of the text and illustrations for layman and architect alike. *Glass in Architecture and Decoration* is an essential reference in any practice, and the new edition will long remain the standard reference work on the subject.

MICHAEL ROSTRON

DIARY

Visit to Imperial College hostels in South Kensington: Architectural Association tour, starting 10 am.
NOVEMBER 11

Some early RIBA *travellers:* Lecture by S. Rowland Pierce at RIBA Library Group, 66 Portland Place, at 6 pm.
NOVEMBER 13

Engineering and Architecture: Lecture by Professor Ing. Riccardo Morandi, Royal Society of Arts, John Adam Street, Adelphi, wc2, at 6 pm.
NOVEMBER 15

Modern Architecture, yesterday, today and tomorrow: Three illustrated public lectures by R. Furneaux Jordan at the RIBA at 6 pm. Admission 6s for the three or 2s 6d each.
NOVEMBER 15, 22, 29

MONTHLY SUPPLEMENT

BASA

BASA EDITOR
BUILDING CENTRE
STORE STREET, LONDON W1

STUDENT'S VIEW

THINKING ABOUT THINKING

At a recent congress of psychiatry in Montreal some interesting views about the process of thinking were propounded by Dr Linus Pauling of California. The congress was fully reported in The Lancet of June 24, 1961, and progressive architectural students and teachers may find some food for thought in the following quotations from The Lancet report.

"Thinking, according to Dr. Pauling, was much more than solving problems; often it involved the recognition of quite new problems by largely unconscious mechanisms which bore little relation to traditional operations of logic. . . ." There was a need to study how ideas arose and for instruction in the art of having ideas. . . . "He favoured the system that required each candidate for a doctor's degree to formulate a dozen new ideas and defend them at his examination: it was possible, he was sure, to train one's unconscious towards this end, for example, by thinking about a problem while waiting for sleep . . . then after a while to let the matter drop. Weeks or months might go by, and suddenly a solution would burst into consciousness. During the interval . . . the unconscious had examined and rejected perhaps hundreds of thousands of ideas in relation to the problem before a significant one was spotted and brought to awareness."

Whether unconscious problem solving could be usefully exploited by architects in their practical work is doubtful, but above all Dr Pauling's ideas clearly suggest how complicated thought processes are. The reference to instruction in the "art of having ideas" seems particularly relevant to architectural education, at a time when several serious and well-meaning groups are concerned with fundamental discussion on this vital subject. How many architects with post-graduate degrees could claim 12 ideas as their own, originals?

EUSTON PORTICO

A telegram was sent to the Prime Minister by BASA on the day following the announcement that the monument was not to be preserved. It read as follows:

"The British Architectural Students Association wish to join other bodies in recording their disapproval of the Minister's apparent apathy in view of informed opinion, to take any action to preserve the fabric of the Euston portico and his failure to republish his reasons of why it was not possible to incorporate this important monument in the new scheme."

A reply was received in the form of an acknowledgment of the telegram.

THE MOTOR SHOW

New body! New engine! Faster! Faster! Faster! this was the cry of this year's show. When please is the cry of Quieter! Quieter! Quieter! and Fumeless! Fumeless! Fumeless! going to appear? How many more years are we to be subjected to that excess of decibels and cough-inducing fumes? Do their designers live in vacuo?

ANONYMOUS DONATIONS

Three anonymous donations totalling £750,000 have been given to London University for male students' hostels. Would it be too much to hope that not only a good architect, but some research into students' housing requirements, get the spending of this money?

SURVIVAL

In a recent Panorama programme, a lengthy film was shown about the construction of "survival" or fall-out shelters in America, after which it was concluded that this possibly was a good thing. When the Panorama commentator came to discuss the efforts being made in Britain in this direction he stopped—why?—because there are none. If architects and architectural students have some social conscience could they not make themselves aware of the design problems involved? Perhaps one day they may be called upon to use them—in rather a hurry.

OXFORD SCHOOL OF ARCHITECTURE

Seven months ago a group of students at the Oxford School formed a committee to explore the possibilities of an international student architectural magazine. They formulated a programme which included contacting students all over the world, finding architects willing to back the project also the various methods of obtaining the necessary money. Enthusiastic contacts were soon established in many countries, Sir Hugh Casson, N. Pevsner, J. M. Richards, Maxwell Fry, wholeheartedly backed the idea and have already met the committee. The financial side as was expected was the least successful. Further possibilities are being looked into in this direction. BASA who also support this idea completely, have been asked by Oxford to request that any students in this country who think they may be able to help in any way, should contact the BASA president.

FIVE LONDON SCHOOLS

Complaints have been received by many students concerning the lack of contact between the five London schools in the past. BASA has remedied this to a certain extent with the contacts made at their conferences, but these are very small compared with what could be done in addition to the occasional rugger match. Would it not be possible for the students' committee in each school to arrange some form of open day to enable the five schools to see the work produced and the environment in which it is being produced? Perhaps the heads of schools could also arrange something.

BASA LETTERS

STUDENT GRANTS

SIR: The correspondence begun last December by Edwin Johnston (and concluded with the letters on this page) seems to have relapsed into an inconclusive and unrewarding debate on the merits or demerits of the Belfast school of architecture. The original target—certain anomalies in the system of local authority grants to students—appears to have been quite forgotten.

What Mr. Johnston intended to reveal was that in certain circumstances, *by no means limited to Northern Ireland*, students could be forced by "manipulation" of grants to attend an institution incapable of affording them the standard of education which they might reasonably expect. The indignation and "pressures" aroused by Mr. Johnston's disparaging references to the Belfast school seem to have distracted him in later correspondence from his primary objective.

May I restate the original case, and add my own observations? The main contentions were as follows:—

1. That *at the time of the first letter*, when the usual entry qualification to a school of architecture was five O-level passes, the great majority of architectural students did not qualify *automatically* for a major grant, for which the normal requirement is two or more A-level passes.

2. That for various reasons—political, financial, or national — some local authorities "adjusted" the value of awards in such a way as to oblige students without independent means to attend local schools of architecture. This practice is far more widespread than many people realise, and applies to many subjects other than architecture.

3. That many students were in this way forced to train for at least part of their course at a school not recognised for exemption from the RIBA external examinations.

4. That *for this reason alone* such a school could not give a student the education which he deserves *because its curriculum and method of work must inevitably be controlled not by the overall aim of educating the student, but by the necessity of manoeuvring him through a set of external examinations which have been widely condemned over the last few years by a considerable number of people—including the* RIBA *in some of its many disguises.*

In linking this question with an attack on a particular school of architecture Mr Johnston clouded the basic issue—that financial and moral blackmail of this sort will continue so long as grant awards remain in the hands of local authorities and subject to a parental means test.

The full value of student grants will only be realised when every student can feel financially independent of both parents and local authority politics. This principle was embodied in the majority report of the Robens Commission on student grants, and it is a pity that the Minister of Education should have rejected it in favour of the insipid but more "expedient" minority report.

CHRIS MUSSON

Previous letters appeared in BASA *Supplement*, AJ, 1.12.60., 2.3.61., 1.6.61.

SIR: After discussing your correspondent's letter of March 2 with some other former students of the Belfast College of Art, I felt it only fair to write giving your readers the facts as seen by an ex-student of the School so harshly criticised by Mr. Johnston.

I, too, shared his impatience at the seemingly long delay in setting up a properly equipped School of Architecture in Belfast where complete qualifications could be obtained by local students. We were advised that the extensive—and very necessary—post-war secondary school building programme was holding up work in connection with the proposed new School in York Street. However, I now understand that Belfast Education Committee hope to commence, in the near future, building operations on this new school, where a five-year course will be provided.

In the meantime the Committee has pursued an intelligent and practical policy to make the best use of the limited accommodation available. A three-year course of instruction is given to take

students to the Intermediate standard and those who qualify are awarded scholarships to attend a school of architecture in Great Britain to complete their qualifications. The College has access to excellent departments of Building and Engineering in the College of Technology and is staffed by a small full-time group of lecturers. Additional assistance is given by a number of practising architects, most of them young men who are members of the Royal Ulster Society of Architects, and who have had, perforce, to obtain their final training in schools in Great Britain. There is thus no tendency to inbreeding and I personally found the lectures and studio criticism most stimulating.

There is freedom of choice as to the College in Great Britain at which a scholarship holder may complete his training, and though I chose one of the London Schools, Edinburgh and Liverpool have proved very popular. One of my former colleagues won the Andrew Grant Bursary and the Grant Travelling Scholarship at Edinburgh, and the Bannister Fletcher Medal and Prize for the highest marks in the Intermediate examination last year were also won by a student from the Belfast College of Art.

From the foregoing you will appreciate my difficulty in agreeing with Mr. Johnston but I also look forward eagerly to the completion of the new School of Architecture and the setting up of the full five-year course. However, it is my opinion that some students should still be encouraged and allowed to go to schools in Great Britain so as to preserve a freshness of outlook—so essential in a small area like Northern Ireland.

I have not met Mr Johnston and can only conclude that he is not familiar with the conditions obtaining in the Belfast College of Art.

R. H. TRIMBLE, DipARCH, ARIBA

SIR: Mr. Johnston seems to have very admirable sentiments with regard to architectural education in Northern Ireland and I admire his courage in putting them into words, but feel his letter would have gained more respect if he had stuck to facts alone and had expressed himself in a less romantic fashion.

The Belfast School, an obscure school in the College of Art, which is a department of the College of Technology, has been in existence for at least 10 years. The number of students who take and pass the Intermediate Examination at the end of three years is extremely low. An average over the past 10 years shows that less than half of the students who sit Inter at the end of three years pass it at the first attempt. I do not think this is a reflection on the students alone, but rather on the very inadequate system of architectural education.

There are only two full-time lecturers at the school who are qualified as architects, and the Principal of the College is not so qualified. Surely the head of the school of architecture should be primarily an architect. The authorities who control the school do not permit the two lecturers to have private practices. This, I feel, is a fatal mistake, as they lose contact with the building and architectural world and find it very difficult to keep up with the latest techniques, research, etc.

Compared with a school such as the Edinburgh School of Architecture, which has made tremendous progress in the past few years, the Belfast School most certainly does not justify its own existence.

BELFAST OPINION

FUNCTION AND EDUCATION

A summary of Henry Swain's paper to the BASA *conference*

Henry Swain, speaking at the BASA York conference, observed that the three influences on modern architecture are appearance, function and cost. These general requirements are obvious in any slum area, yet it seemed to him that the principal particular requirement should be the ability of the building to meet the needs of those who will use it. This should be the basis for modern architecture; yet it is quite obvious from the fact, for instance, that, although our way of life has changed enormously during the last 50 years, house or community design has hardly done so at all, that it is not. The architect must realise that the problem is to discover and solve the needs of a community rather than treat architectural style as an end in itself. And now his most important task is to evolve methods of analysing these needs.

He proceeded to discuss the way in which requirements for schools may be satisfied, saying that he noticed when at the Triennale Exhibition in Milan last year that visitors were most impressed by the English school exhibited, because its design was so closely related to its function. The method employed in achieving this relationship could well be used to advantage in other types of building. For although when designing a school he must consider such factors as its relation to the geographical surroundings, the desired capacity, and available labour, time and cost, the architect's most important consideration must be the purpose for which he is building. And this cannot be done simply by asking the education authorities and the teacher what is required for it. Information gained in such a way would not be detailed enough, and—more important—it would inevitably be based on what the informer already knew, rather than on what could be. It is only the architect who, on seeing what will happen in his buildings, can envisage the best surroundings for the work that is to be done there.

Mr. Swain said that in Nottinghamshire, designs for schools are preceded by a careful enquiry into their requirements. In preparation for designing two comprehensive schools to be started next year, he and his colleagues visited seven similar ones in London, Coventry and Nottingham. It was not until they had discovered in this way how their schools were likely to be used that they felt fully equipped to begin planning them.

Because any questionnaire tends to produce presupposed answers and to restrict the expression of creative thought, they found what they wanted to know—what actually went on in the school—by discussion with staff, and by seeing for themselves. But they were interested not only in what happens in these schools now, but also in what is likely to happen there in the future, recognising that methods in education are still developing rapidly, and that flexibility to allow for this is one of the school's first requirements for encouraging progress. Of course, many of the notes which were afterwards written up were of no immediate use; but the desired knowledge had been gained, and the additional matter helped to identify the architects more subjectively with the purpose of their work.

After hearing the head teacher's opinions on education, as it is now and is likely to develop in the schools, they saw what he had said being put into practice. Some of the things that they noticed were the tendency to take meals in small, more intimate units, the way in which extra-curricular lunch-time activities were encouraged, and particularly the way in which different classes are conducted in varied and individual ways. For in-

continued on page 884

ANTI UGLY 1

HIGHGATE . . . LOVELY?

Highgate . . . lovely ? During the early forties the Taylor & Green house (6) with High Point flats was the Mecca of many a student and architect alike. Unfortunately during the last few years a car dealer decided that Highgate village would be a nice place to develop his business. He found a site in Highgate High Street, behind the Duke's Head and beside the house Taylor and Green built there in 1939. The photographs show the results to date. The blatant use of common bricks and corrugated asbestos has produced behind the seemingly village-like façade of Highgate Hill something reminiscent of the Great West Road. May those of the local council, who have allowed not only the ruination of this fine example of pre-war housing but also the general destruction of the village scale here, hang their heads in shame. It should be noted that the owner of the garage does not live in Highgate village.

1

PHOTOS 1—5 BY TIM STREET-PORTER

2

3

1 *The usual unsightly mess that goes with garages of this type*

2 *View from second floor of house, Highgate school in distance, to west*

3 *Highgate High Street today, looking South*

4 *View from second floor of house, looking east*

5 *View to rear of Highgate High Street showing extent of development*

6 *House as it was before development started two years ago*

4

5

6

stance, today it is common to use such equipment as radio, tape-recorder and film-strip-projector in the normal course of a lesson, and, particularly with younger or backward forms, to teach by setting the children to work in smaller groups within the class and by encouraging them in drawing, model-making and acting. And in rooms specifically for practical work, surroundings directly relating to the subject are needed. Because of the activities and methods used in needlework, the necessary surroundings are those of an informal studio with a more domestic atmosphere.

With this sort of information from seven schools, augmented by the advice of the Assistant Director of Education, the conception of an ideal school begins to emerge. And it is at once plain that this would be far too costly and is therefore unattainable. But it is at least possible to make full use of all available space and material. For example, although many craft subjects are often combined (as in the making of a sailing dinghy) it is not possible to supply an extra room where this combination can be put into practice. But it is possible to dispense with one of the woodwork rooms and have instead all the work-rooms opening off from a central shed, where such work could be done. This plan would also help the children to appreciate the relationship between their subjects. Again, because the house-system is an important aspect of the comprehensive school, and a central hall is consequently seldom used, it would be more satisfactory to substitute for this a small hall and several house rooms for dining, prep. and evening use.

When all similar aspects have been discussed, and a solution to all the problems evolved, it is difficult to distinguish between the educationalist and the architect concerning the responsibility for ideas. But through their close co-operation, it is possible to build a school which not only meets present requirements, but which is also forward-looking. For although this co-operation alone does not cover technical aspects of the building; and such knowledge could not by itself make a good school, yet during the months of planning, it is the starting-point which provides a focus and stimulates subsequent architectural thought. And Mr Swain stressed the value of the enquiry having been done by the architect himself rather than by an impersonal expert. By obtaining knowledge of his clients' problems in this way he discovers far more than the statistician could tell him, and establishes a close link between himself and those who will use his building. An insight into their lives and aspirations, he said, is the real generator of modern architecture.

Listing points arising from this method, he stressed the two advantages it has in allowing the architect to work with his client (and in this particular case, this involves not only the head teacher but everyone concerned in the school), and in making him subjective about his work through self-identification, in this case with education. Another point in its favour is that it makes the architect really study other buildings with the same purpose as his own, which is of benefit even if these are bad, for this pin-points the problems he must consider. He also said that one must be careful to select with reference to need rather than personal prejudices, and that one must summarise the results of the user requirement analysis clearly to enable the client to help to make decisions.

Finally, Mr Swain said that the interest in people aroused by this study helps to remind the architect of the significance of his job. And it is interesting that in school building (where this method has been most employed, subordinating architecture to a definite social aim) some of our best modern architecture has been produced. His experience had indeed assured him that "the architect's real creative work is inspired not by architectural style, but by a sympathetically acquired and detailed knowledge of the people for whom he is designing."

IDEOLOGY AND UTOPIA

While training as an architect my attention was drawn to some aspects of it which seemed to be amiss. These phenomena were psychological and my experience forms the primary source of information, together with observation and some reading. Many ideas which arose from my preoccupation, were not arranged as a theory, but quite by chance, the remarks of two people seemed to gel the whole collection. The precipitate was the idea that most failures in design careers, are of an ideological nature and rarely through lack of talent. They are simply squandered creative energy.

The two remarks were these:

"Never before have I met so many individuals, each so certain that he is right" (of architects). "Advance is limited only by the dearth of organising ability; creative people are ten a penny" (of design).

In recent years large-scale programmes have demanded the type of overall planning which one can only describe as "brave new world." Projects have become so large that their impact on the existing environment is tantamount to the imposition of a way of life. (One could cite many large redevelopment and development schemes as examples.)

In facing this problem of evaluating the net of social interactions, planners often risk distortion of the problem by over-simplifying the case. Rigour takes time and money.

When responsibility is widest, the threat of idealising the situation is great, and if the designer succumbs, the result becomes a garbled scheme with many gimmicks and little integrity. Examples are easy to find, especially where symbolism is involved (Chandigard; Brasiliu).

When one considers the school project, the same condition prevails. A student is faced with a problem, in which some of the concepts and skills necessary for its solution, are new. It is the first scheme, say, in which an economic limit is imposed. In such a case, the student is liable if not warned of the dangers, to apply theory lifted from other fields of knowledge. The resultant form will be as unreal as the hypotheses on which it is based, but this is not altogether a net of feeble intelligence. It is rather one of ignorance of the more subtle fact of the case. (One can find many examples of good reasoning from unsound foundation, in primitive religion.)

The degree of aberration in student design thought, is proportional to the degree in which the programme is in excess of available information and skills of the student. Unfortunately the gap is kept wide in a misguided attempt to teach by experience, but the result is superficiality of some schemes and lateness of others.

For some, the school career is spent in blissful ignorance of the situation; the students navigate the sea of styles, with full sail and a dextrous use of the rudder. For others the conditions are anathema, but it is in the hands of this few that the future of architecture lies. It is for this few also that the traps of ideology are set to take their toll in fruitless speculation.

The aim of education is to kindle in the student, awareness, thought, and action. For this process to abort, to the subsequent dissociation of the parts, is a disaster, and can easily result from

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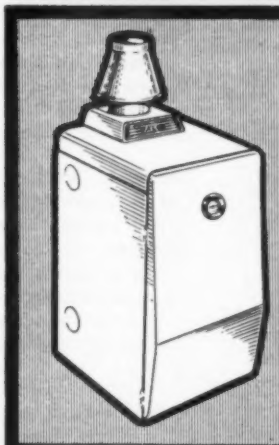

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answering ill-phrased problems. Such conditions exist in the stultifying presence of a "hard" client, a complete break being formed between the architect's awareness and his possible courses of action.

There are two reactions to a situation of this type. The pragmatist "gives the blighter what he wants." The speculator and theoriser, is more likely to dwell on the subject, and rationalise the conflicting elements into a pattern. This is spurious reasoning, but removes the tension of going against one's better judgment. The difference between a rationalisation and an ideology is then only a matter of degree, and occurs when the rationalisations cover a large and fundamental set of problems. The food for (spurious) thought can come from both extensive projects, and indiscriminate reading which tend to be complimentary in the impatient half-trained student.

At this stage the symptoms are obvious. The individual becomes contemplative and constantly in search of material to endorse his views. This drives him to an aggressive and pedantic approach to conversation. The shakey tenets of his argument moreover, debar any reasoned criticism, and mutual distaste is likely to occurr between student and informed staff. The student tends therefore, to associate with those who support his views, better authority being anathema. In an extreme defensive action he may coin his own vocabulary for his ideas, and so shift any criticism onto his own ground. This is usually rationalised into a desire for precise definitions, which are not forthcoming from common language (usually through his own ineptitude of use).

UTOPIA

Some far-sighted people have managed to implement "Utopian" ideas, notably Corbusier. Some have proposed many still to be tried. (Fuller's check lists and Dymaxion House for instance.) Unfortunately the pudding must be proven by the eating, and it is not easy to decide what is Utopian or Ideological, before hand.

The two kinds of thought are of the same stock, the one being a stunted and spurious form of the other. One cannot therefore nurture the creative instinct, without feeding the parasite. It is possible however, to define the causes and conditions for abortive ideas, and try to avoid them.

Utopian thought is extreme (extreme awareness— extreme depth of thought, and extreme action), but it is co-ordinated. Ideological thought is uncoordinated, and structurally sound. It is a breakdown in the inability to organise information and policy, honestly and logically.

The remedies I suggest are not new, but may help to endorse opinion. Firstly, every problem must be programmed to fall within the limit of the students' knowledge in order to avoid his making a shrewd guess in lieu of responsible action.

Secondly, great stress must be placed on discussion and constructive criticism among both students and staff. Ideas out in the open and under fire, cannot go stale, but always the right of retaliation must be preserved. The damning of a scheme out of hand, is the easiest way to convince a student that it was too "avant-garde" to be appreciated.

Thirdly, there should be acceptance of *all* off-beat ideas and schemes, with one proviso, that the author can make a full report on the tenets, and the method of implementation. This should take into account all the existing restrictions and social prejudices, with full accounts of the approaches to specific bodies and individuals.

By these means I am sure we can soon have thoroughgoing idealism, and less mercenary pragmatism, from our rising generation of architects. No longer will they be individuals all "flogging their own lives." A realistic approach combined with far-sighted ideas will be born, and the organising ability will flourish with it. Then and only then, will the architect be a dynamic force in the shaping of our environment.

N. GOUGH

File this week

Foundations, the subject of this week's Element File (SfB (16)-(19)), starts on page 897, but from the opposite page onwards the AJ is preclassified for tearing out and filing in SfB order. The subjects are as follows:

1. **Publications File** page 886. This is really only a news item, but you are advised to file under SfB Aa2 since there will be a time lag before the best of the publications listed find their way into the EDG.

2. Technical Study pages 887-892 **Structural Shells in Timber, 4.** File this with the other three articles in this series (which is now finished) under SfB (27)Hi: UDC 69.024.4:694.1.

3. Working Detail **Glazed wall: Shopping centre in Helsinki, Finland,** pages 893, 894. File under SfB (21): UDC 69.022.33.

4. **Products File** pages 895, 896. This is a record of new products and services on the market so arranged that it can be torn into A6 sheets. Each item is classified separately, so you can, if you like, cut the sheet and file each item in its correct place. Alternatively you can leave the sheet intact and keep it together with earlier and later sheets under Aa2 in your SfB file.

5. Building Study, second series, pages 897-906 **Housing for Old People.** File under SfB (98): UDC 728.1.
Then follows the Element File, pages 907-918, plus the Information Sheets and elemental advertisements. This is entitled **Foundations** and should be filed, preferably as one whole, under SfB (16)-(19). Alternatively, as this file differs from all the others in comprising more than one SfB heading, readers may divide it and file the items under their separate headings. The Element File contains the following:

6. **Element Design Guide** pages 909-918.

7. Six Information Sheets, four on **Foundations for light structures** and **two on Pile Foundations.**

AJ **SfB Aa2**

Publications File UDC 03 References: Handbooks

Publications File

(47) Ln 69.024.158
Finishes, roof: Felts, bituminous

Bitumen felt roof coverings. BS Code of Practice 144.101:1961. Published by British Standards Institution. 7s 6d.
An essential office reference, giving information not only on detailing and specification but also on good site practice.

(47) Ln 69.024.158
Finishes, roof: Felts, bituminous

Classification of roofing felts. BS 747:1961. Published by British Standards Institution. 7s 6d.
This standard goes very much further than its predecessor of the same name and number as it not only classifies the great variety of felts but specifies what each should contain. With this and the new CP 144.101 (see above) the architect has a complete reference for this class of product.

(56) 697.243
Installations, heating: Fires, stoves

Domestic heating stoves using coke and other solid fuels. BS 3378:1961. Published by British Standards Institution. 5s.
This is a useful standard for architects as it lists the performance to be expected from stoves of different types and sizes.

(56) 697.326
Installations, heating: Boilers, burners

Boiler specification list. Published by The Plumber and Journal of Heating. Available from Dale Reynolds and Co Ltd, 2 Broad Street Place, London, EC2. 1s 3d.
A first list includes all solid fuel boilers available on the British market up to 60,000 Btu and gives complete specification data on every model, with name and address of manufacturer. Further lists, to be published later, will deal with solid fuel boilers up to 120,000 Btu, back boilers, oil, gas and electric boilers.

(60) 621.315
Electrical accessories: Cables, wires

Rubber insulation and sheath of electric cables. BS 2899: Part 3:1961. Published by British Standards Institution. 5s.
This revision brings butyl rubber into the scope of this standard.

(60) 621.315
Electrical accessories: Cables, wires

Butyl-rubber-insulated cables and cords with heat-resisting fibre layer. BS 3387: 1961. Published by British Standards Institution. 5s.
These cables and cords are used where temperatures do not become higher than 100 deg C. This standard and BS 3258 on the silicone counterparts together replace an earlier standard on insulated asbestos roved flexible cords.

(74) 696.144
Lavatories, fixtures and equipment: Baths, showers

Cast iron baths for domestic purposes. BS 1189:1961. Published by British Standards Institution. 6s.
This republication of a standard originally devised for post-war housing now includes the sitz bath.

(84) 614.48
Spaces, fixtures : Health and welfare buildings

Central sterile supply. Edited by Brian Watkin. Published by Macmillan and Co Ltd. 4s 6d.
This book describes the three CSSDs so far set up in this country (Musgrove Park, Wessex and Addenbrooke) and how they operate. Though written chiefly for nurses, it is useful reading for architects also.

(98) 728.4
Residential and social buildings

Accommodation for nursing staff. Hospital Building Bulletin No 2. Published by MOH. Available from HMSO. 3s.
Tabulates the Ministry's rather meagre space standards and gives useful information on services and equipment. An important reference. Reviewed AJ 1.11.61, page 818.

Ab3 624.012.45
Structural engineering: concrete, in situ

Elementary principles of reinforced concrete design. By W. H. Elgar. Published by The Architectural Press. 18s 6d.
Textbook for students. Good on design of beams, slabs, simple columns and bases.

Ac1 711.03
Planning: History

The city in history. By Lewis Mumford. Published by Secker and Warburg. 70s.
Essential background reading for all architects and planners. Reviewed AJ 18.10.61, page 657.

Ac5 712.001
Landscape, spaces: General

Space for living: Landscape architecture and the allied arts and professions. Edited by Sylvia Crowe. Published by Djambatan, Amsterdam. £3 12s.
The main speeches at last year's conference of the International Federation of Landscape Architects at Amsterdam, presented with many glossy photographs as a handsome but expensive volume. Lewis Mumford and Peter Shepheard are outstandingly readable, but the book is scarcely a " must."

Ba7 69.003.13
Economics: Price planning and price control

Estimating and cost control. By James Nisbet and others. Published by Batsford. 32s 6d.
A clear, authoritative study of cost planning and of the social and technical reasons for it. Reviewed AJ 25.10.61, page 741.

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AJ SfB (27) Hi

Technical study UDC 69·024·4: 694·1
Roofs, structural, pitched: Shells

Structural shells in timber

4 Materials (concluded): Recent examples in this country

In this, the last article in their series, Hugh Tottenham and Charlotte Hume specify the materials to be used in timber shells and then go on to describe a number of timber shell structures built during the last few years. Taking in order domes, vault shapes and saddle shapes, they note how the choice of form was arrived at in each case and give technical details*

Materials

(*a*) TIMBER. The timber in shell construction can be divided roughly into two categories; that used for laminated timber and that used in boards for the shell membrane.

The timber in the edge beams, whether laminated or cut out of the solid, must be of a structural quality. The precise quality and species will need to be specified, but generally any species included in Group II of BSCP 112:1952 can be used. There should be no difficulties in obtaining the required quality from " unsorted " Redwood or Whitewood. The shell boards may be from " 5th " or better grades of similar species. In specifying the material the only provision required, apart from the usual ones respecting decay and insect attack, is that the boards must be free from wane. General t and g boarding will be found to be cheaper in the long run as the erection is much more rapid than with square edged boards.

Preservative treatment against fungus and insects is always advisable, but the type of preservative treatment will depend on individual requirements.

(*b*) ADHESIVES. The choice of the adhesive will be dependent upon the situation of the fabricated component; thus if full protection against the weather is provided and the surrounding atmosphere is not expected to be humid, cold setting casein adhesives to BS 1444 may be used. When weather protection is provided but humid atmosphere is anticipated, a cold setting gap filling synthetic resin adhesive of the urea formaldehyde type is suitable. For fully exposed glued laminated work a resorcinol type of adhesive must be used. Synthetic resin adhesives should be in accordance with BS 1204 and fall in the class MR (GF and CC) and WPB (GF and CC) for urea and resorcinal resins respectively. All adhesives should be used strictly in accordance with the manufacturers' instructions for the type of work.

The moisture content of the timber must be closely controlled for all glued laminated work. Generally a moisture content of 14 per cent plus or minus 2 per cent will be suitable, but if the final conditions of the shell are likely to be such that a lower equilibrium moisture content will be reached, this should be specified.

(*c*) NAILS. Normally ring-shanked wire nails are suitable, length and gauge will depend upon the thickness and number of layers and must be specified to satisfy these requirements.

(*d*) SCREWS. Wood screws to BS 1210 can generally be used but for fixing of edge beams coach screws are normally required. At present these are not covered in a British Standard. Size, gauge, length, etc of screws will depend upon the type of connection, loading, etc, and must be selected to comply with these.

(*e*) METALWORK. Most of the metal attachments can be made from mild steel in accordance with BS 15.

* Previous articles in this series were published on October 11, October 18 and November 1, 1961.

Recent examples in this country

There are already examples in this country of most of the geometrical variations of shell structure described in the second and third articles in this series. We now review briefly one or more representative examples of each, describing the structure and any special requirements influencing the design. Unless otherwise stated, the authors were both architects and engineers to the building.

Rotational dome

The only example of a rotational dome is that of a workshop for the Dorchem Engineering Company Limited at Stillington. This was in a sense a freak structure as the workshop had to represent the containment vessel of a nuclear reactor. Also it had to be completely airtight. The solution was a hemisphere of 75 ft supported on a reinforced concrete floorslab which also served as an external ring beam. The structure was fully prefabricated (the regular hemispherical shape made this easier) and the fact that roof and walls were of a single material reduced to a minimum the difficulties of providing airtight joints (see Figs 2 and 3).

The structural dome is of ribbed construction, having sixteen 9 in by 6 in radial laminated timber ribs, spaced equidistant around the perimeter. The shell membrane which is nailed and glued throughout consists of two layers of $\frac{7}{8}$ in thick t and g boarding. As none of the timber is exposed externally, casein glue was used throughout. At the apex the ribs bear against a timber thrust ring.

An internal lining of $\frac{1}{4}$ in thick plywood screwed on to a light frame is suspended from the dome. The ribs of the dome which are used for shuttering out the lining had to be positioned to an accuracy of $\frac{1}{8}$ in under all conditions of loading and were, therefore, heavier than would otherwise be necessary.

The external surface is waterproofed with a hessian based bituminous mastic with an aluminium surface.

Translational dome

The choice of a translational dome (to be exact an elliptical paraboloid) for the Friends Meeting House at Nottingham (architects Bartlett and Gray) was determined partly by the desire for an interior which had no fixed orientation, partly by the wish to avoid internal ties. The shell covers an area of 38 ft square, has a rise of 4 ft 8 in on each side, and a total rise of 9 ft 6 in (ie $\frac{1}{4}$ of span) at the centre (Fig 4). The shell membrane consists of three layers of $\frac{7}{8}$ in t and g boarding which are nailed and glued to one another with a casein adhesive. The direction of the different layers varies in each successive layer and was determined from considerations of both strength and rigidity.

The edge of the shell is stiffened by 9 in by $5\frac{1}{2}$ in laminated timber ribs; these ribs also transmit the load from the shell to the supports at the four corners. These are tied together with 6 in by $5\frac{1}{2}$ in laminated timber members. Both arches and ribs are exposed and, therefore, a resorcinol type of glue was used. The segmental areas between the arches and ties are glazed to provide natural lighting.

Vault shapes: Barrel vaults

We give two examples of timber barrel vaults. The first, the new workshops and drawing office at Dauntsey School, Wiltshire (engineers Timber Development Association), is of special interest in that it was designed to be built by the boys themselves. It therefore demonstrates that timber shell construction is not an exceptionally intricate operation. The original design consisted of three barrel vaults, each pierced to give natural lighting. One of these has been built (Fig 5); but the boys then thought that they would prefer to roof the remaining areas of the plan with hyperbolic paraboloids.

The three barrels of the original design covered an area measuring 23 ft by 44 ft, 18 ft by 44 ft, and 35 ft by 30 ft, respectively. The two narrow shells were to have a simple membrane of four layers of $\frac{3}{4}$ in boarding, while the wider shell which has a radius of 21 ft 9 in (this is the one which has been completed) has two stiffening ribs made from four $1\frac{1}{4}$ in by 6 in vertical laminates, glued and screwed together. The edge and valley beams are supported on block walls and consist of 6 in by $6\frac{1}{8}$ in laminated timber. The gable beams are of box construction, the ties and arched ribs being built up from four $1\frac{1}{2}$ in by 6 in vertical boards and the faces covered with $\frac{1}{2}$ in by 6 in match boarding inclined at 45 degrees to the vertical.

After the shell was completed the openings for the roof lights were cut out and the glazing was laid flush with the boards; no curbs or stiffeners were required. The roof is covered with bituminous felt.

A second example of a timber barrel is the British Railways Parcels Depot at Coventry (engineers Timber Development Association). British Railways wanted an area 100 ft by 190 ft free of internal supports, with a small volume of roof space and a standard of natural lighting which could only be provided by glazing 30 per cent of the plan area. Five cylindrical barrel vaults were used, each 100 ft by 38 ft, with a rise of 13 ft (Fig 6). Each bay of the roof consists of a valley beam, shell membrane, gable beam and roof light frame. The valley beams are built up I beams with laminated top and bottom flange and two layers of boarding for the web. The shell membrane consists of four layers of $\frac{3}{4}$ in boarding, nailed and glued together, stiffened by 4 in by 6 in ribs at 5 ft centres. These ribs were built up from two pieces of 2 in by 6 in plank with staggered butt joints, simply nailed and glued together.

The roof light frame possesses laminated curbs and transverse ribs; the former are 10 in by 15 in and the latter 13 in by 5 in spaced at 10 ft centres. Every alternate stiffening rib of the shell coincides with these transverse ribs and they are connected across the roof light opening.

Vault shapes: Cross vault.

A number of cross vault structures have been built for the Phoenix Timber Company at Rainham to serve as open storage sheds. They are 60 ft square, with horizontal eaves and are pierced in the centre for lighting (see Fig 7). The structures were designed for prefabrication, ie the vaults were built on the ground, in sections. The cross vault solution was chosen because the main and secondary ribs of this system can accommodate site joints and there is, therefore, no need to add any other members to the prefabricated units.

The construction used for these shells is as follows:

Edge beams are formed from 3 ft deep I beams, the flanges of which consist of two 9 in by 3 in laminated sections at both top and bottom; sandwiched between are two layers of $\frac{3}{4}$ in. t and g boarding. The four sectional barrels are of two layers of boarding, glued and nailed to each other and to stiffening ribs which are laminated to a 6 in by 4 in section and are spaced at about 12 ft centres.

The hip members along which the barrels intersect are in the form of a laminated arch, 9 in by 6 in in cross section. They are housed into the edge beams at the lower ends and bear against a ring beam at the apex. The latter forms the framing of the central roof light.

The rise of the 60 ft square shell is 10 ft and that of the smaller shells 8 ft. All roofs were covered with a proprietary form of bituminous felt.

Conoids

The choice of timber for British Railways Oxford Road Station, Manchester (Fig 8), was decided by the consideration

that, since the lines beneath were already at first floor level (with shops beneath), it was important that the new roof (covering a much larger area than the old one) was as light as possible. The architect for the project was the Chief Architect, British Railways, London Midland Region, the engineers Timber Development Association. The solution chosen comprises three receding conoids. These each have a span of 35 ft, but vary in width from 41 ft 6 in to 97 ft 3 in. Each has a laminated arch at the front and a laminated tie at the rear. The segmental area at the front of each shell was glazed to achieve a very high standard of natural lighting. All ties were built up into box sections to obtain the maximum stiffness at the back edge of each shell and the tie at the far end of the smallest shell was actually in the form of a portal frame. All these ties and arches, were fabricated in the shop.

The shells themselves were constructed of three layers of boarding and the largest one also has stiffening ribs which are 3 in by 8 in members spaced at 14 ft centres. The edges of the shell are connected to the prefabricated cylindrical shell canopies by a plywood gutter unit.

The rise of the largest shell is 20 ft and that of the smallest 14 ft and each has a cantilever projecting over the arch stiffening ribs to provide a better structural balance to the shells. The cantilever varied from 16 ft on the largest shell to 14 ft on the smallest.

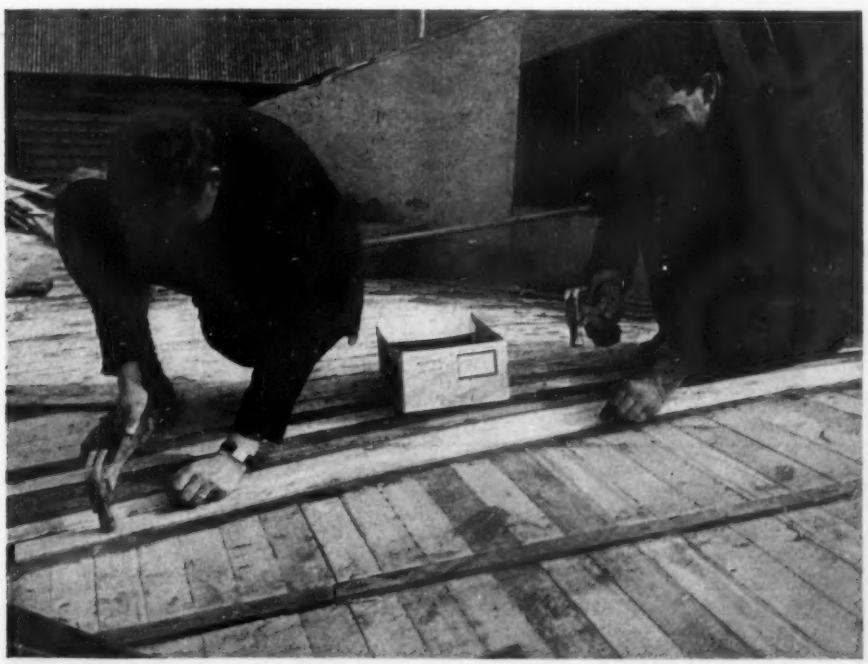
A design of similar type is being used at the TDA's own testing laboratory at Tylers Green.

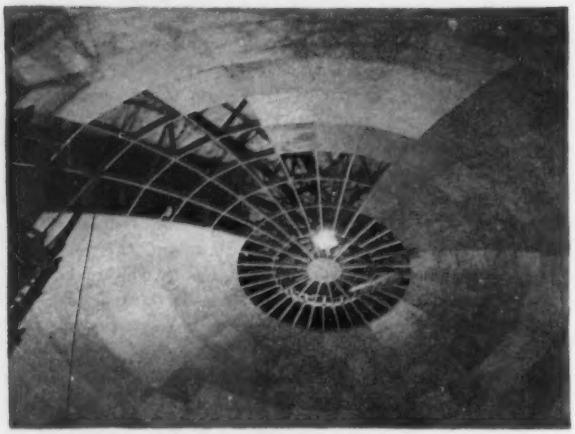
Saddle shapes: Hyperbolic paraboloids

The saddle shape is the form most often associated with timber shells in this country. The pioneer example in this country, the Wilton Carpet Factory, was mentioned in the first article in this series. A later example is a factory at Petersfield for Calibrated Papers Limited (architects Carter, Salaman, McIver and Upfield). The requirements in this case were a factory area of 10,000 sq ft which could be extended in stages to about 35,000 sq ft, and the internal floor space had to be kept as clear as possible. The architects' proposal for the factory area was based on the repetitive use of a hexagonal unit and by further additions of this unit the required space could be covered at any suitable time. Initially seven hexagons would be built and this would be the module upon which the future extension would be based. Each of these modules cover an area of 5,000 sq ft. The photograph (Fig 9) shows the first two hexagons completed. Each of the hexagons is made up of three hyperbolic paraboloids: thus each hyperbolic paraboloid shell is rhombic in plan and the thrust is taken on reinforced concrete buttresses. No ties could be accommodated as these would obstruct the internal circulation of the mechanical plant. The thrust on the buttresses and columns would naturally vary as the stages of construction progressed and they were, therefore, designed to be capable of satisfying the final structure. Temporary struts are provided to cater for the temporary intermediate conditions.

The shells are all identical in form, ie rhombic on plan, with 44 ft 6 in sides and an angle at the low corner of 60° on X plan. The shell membranes are of three layers of $\frac{3}{4}$ in nominal t and g boards laid parallel to the diagonals, nailed and glued together over the whole surface. The edge beams are of laminated construction, made in two sections, $5\frac{1}{4}$ in by 8 in and $3\frac{1}{2}$ in by 8 in, respectively, and these are fixed above and below the shell. The lowest point of the shell is 8 ft from finished floor level; the rise of each individual shell is 9 ft 6 in. The edge beams are laminated with a resorcinol

Fig 1 Shell under construction showing the second layer of boards being fixed





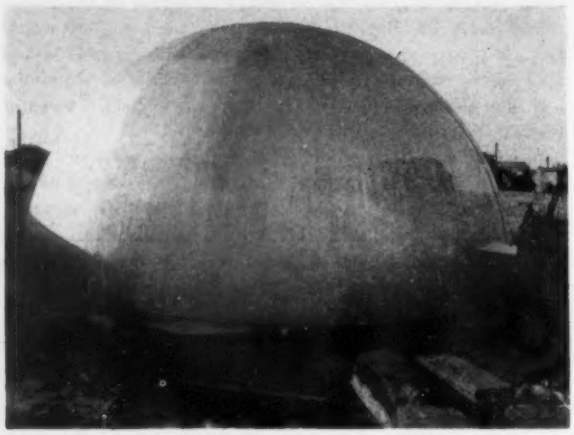


Fig 2 and 3 Internal and external view of prefabricated timber workshop at Stillington

type of glue, as they are exposed, but a casein glue was used for the shell.

The contractor erected a temporary workshop on the site and developed a prefabricated system for the scaffolding and formwork which could be dismantled and re-erected in a new position within one day. Although they had had no previous experience of shell construction, the contractor's final price for the first stage of construction was only 14s per sq ft of factory area. The shells are covered with a proprietary mastic emulsion with an aluminium surface.

If the example just quoted is interesting for the application of a timber shell to a very large and permanent building, this next example comes at the other end of the scale. It is a demountable stand built for the Timber Development Association and the Forestry Commission for use at the Royal Show (Fig 10). The stand covers an area of 40 ft by 60 ft on plan. The roof is made of four shells which are supported on four columns, one at the centre of each side. Each of the four shells is prefabricated in four sections. It is hoped that this prototype structure may lead to the development of a mass produced packaged building which farmers could put up for themselves.

The prefabricated units consist of two layers of $\frac{7}{8}$ in boarding with 2 in by 3 in trimming members above and below the shell, all being glued and nailed together throughout.

The units are bolted to each other and to the edge beams with $\frac{3}{8}$ in diameter bolts and single sided toothplate connectors, which had been fixed into the units at the shop. The edge beams are 4 in by 8 in solid timber sections. Ties are provided which are of 1 in diameter Macalloy bars, and the whole structure is supported on four 10 in diameter poles, braced to the edge beams to give lateral stability. All the timber used throughout was pressure impregnated; no waterproofing was applied to the top surface of the roof.

The last example of a hyperbolic paraboloid roof is the Assembly Hall of the Wigstone Fields Infants' School, Leicester (architect T. A. Collins, County Architect, Leicester County Council). The technical interest of this example (which is illustrated in Fig 11) lies in the fact that the plan shape was predetermined at 36 ft by 59 ft (ie a long rectangle), that support could only be got at the middle of the two short ends and at about $\frac{1}{3}$ of the way along the long sides, that the roof was not to rise more than 5 ft and that there were to be no internal ties or external buttresses.

These requirements were met. The roof was made of four shells, two 19 ft 6 in by 19 ft, two 30 ft 6 in by 19 ft. These were all of similar construction, comprising a membrane consisting of three layers of $\frac{3}{4}$ in boarding laid at 45 deg

Fig 4 Progress photograph of elliptical paraboloid dome over Friends' Meeting House, Nottingham

Fig 5 Timber barrel vault at Dauntsey School being constructed by schoolboys, right

Fig 6 Internal view of timber barrel over British Railways parcels depot at Coventry

Fig 7 Cross vault over storage shed at Rainham

Fig 8 Timber conoids over Oxford Road Station, Manchester

Fig 9 Two contiguous bays roofed by hyperbolic paraboloids at Petersfield

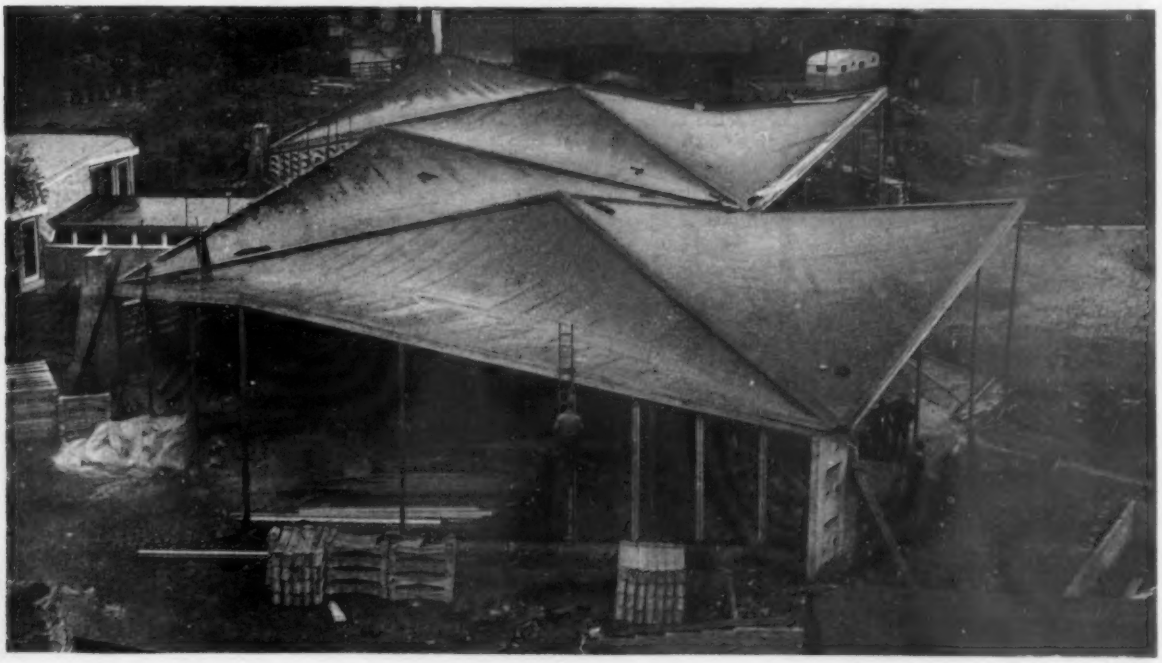


Fig 10 *Demountable stand at Royal Show*

to the edge beams, which are 6 in by 6 in in section, of laminated construction for the larger shells and of solid timber for the smaller ones. The out of balance loads in the roof are resisted by a cranked steel joist between the edge beams of the four shells where they abut each other across the building and a horizontal frame at the other end of the larger shells. This frame consists of two laminated timber struts, 6 in by 24 in laid flat and a steel tie within the horizontal edge beams at that end of the building. Laminated struts and steel tie form a triangle in plan, the base being the end of the roof and the apex along the spine formed by two adjacent edge beams. The whole of the surface of the shell was nailed; glue was only used over a distance of 3 ft from the edge beams. The adhesive used in all the laminated construction was resorcinol.

Fig 11 *Internal view of hyperbolic paraboloid roof over assembly hall at Wigstone Fields Infants School, Leicester*

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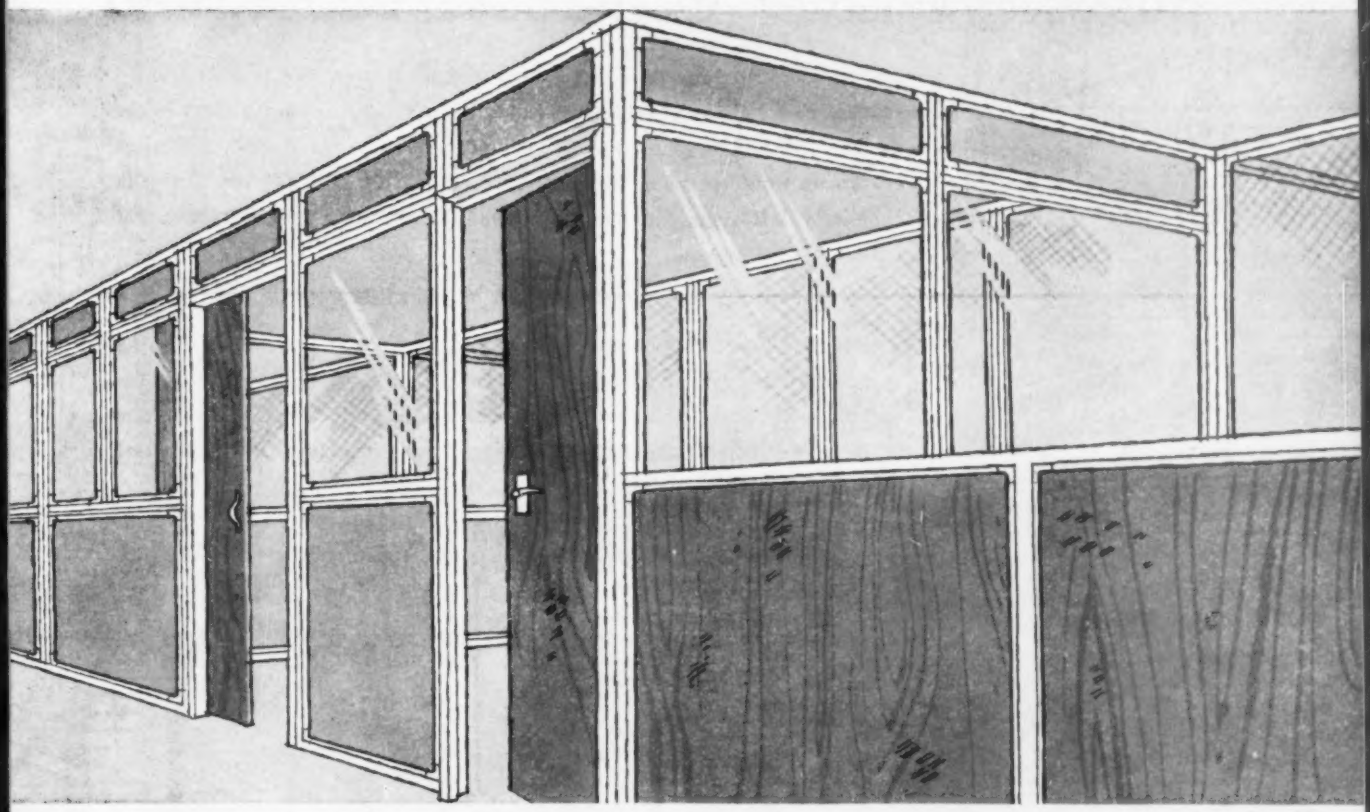

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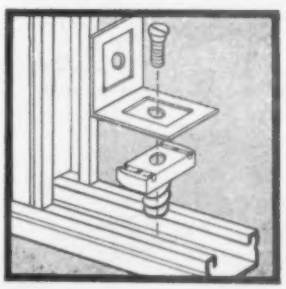

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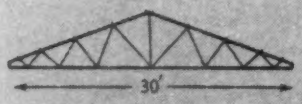

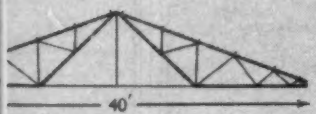

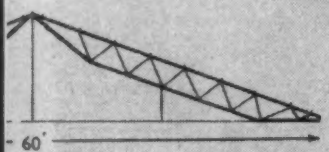

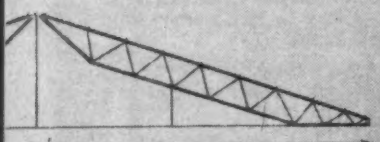

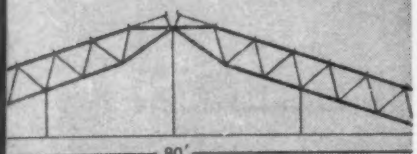

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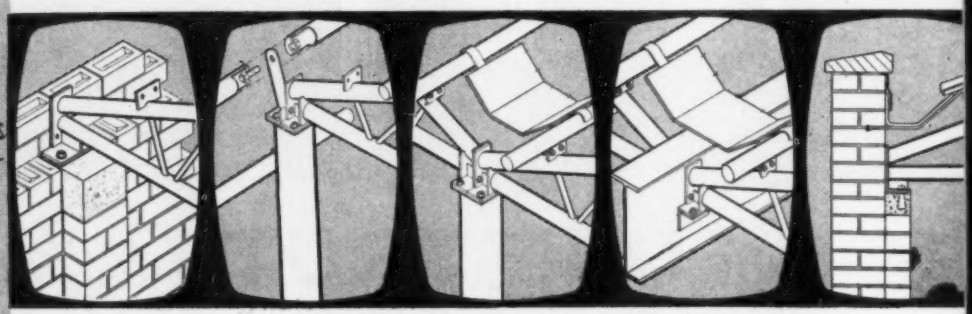

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AJ SfB (21)

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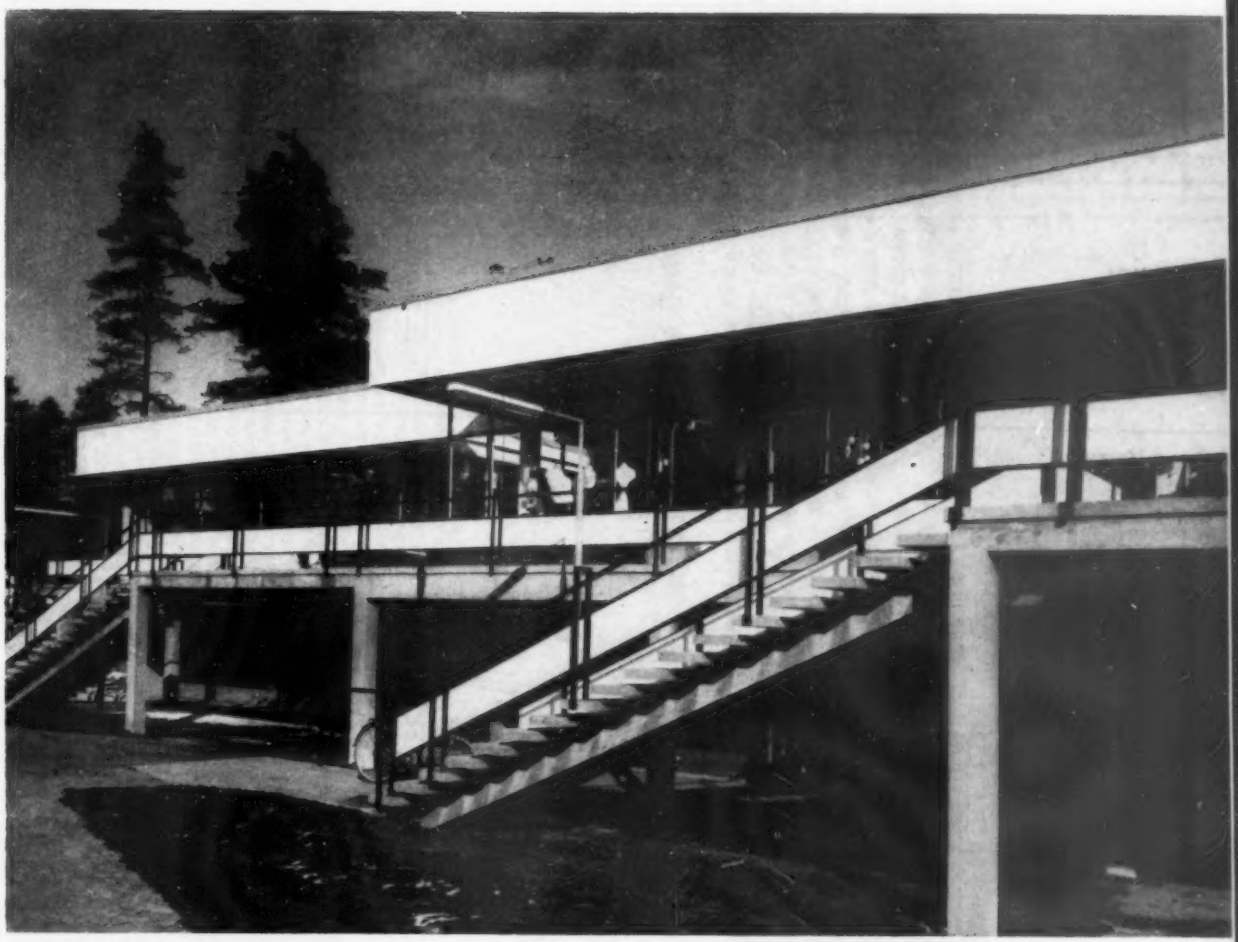
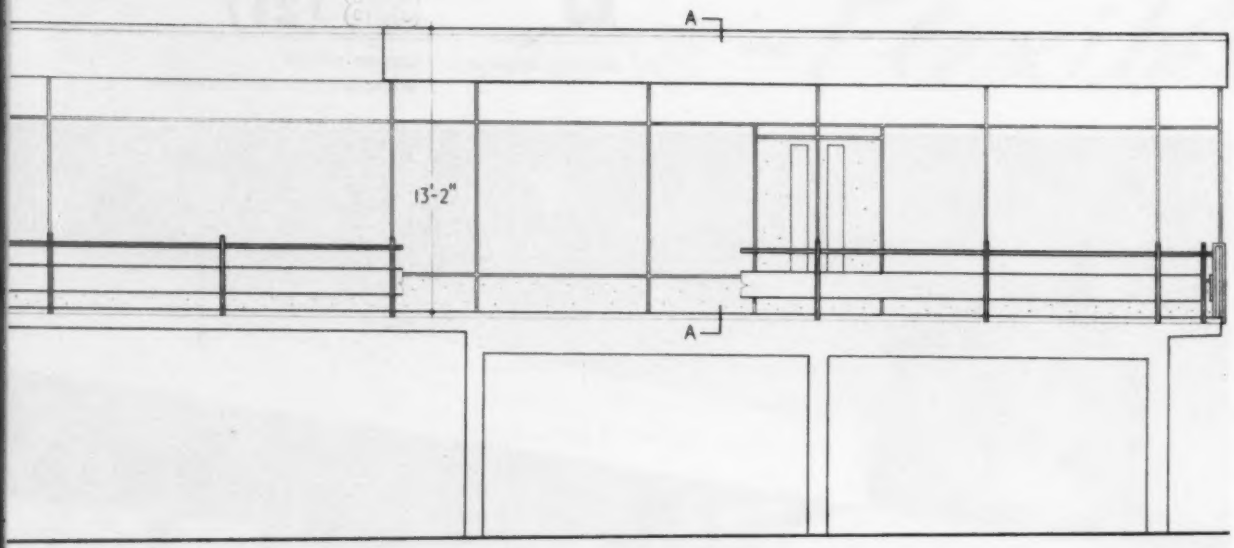
Walls: External non-loadbearing



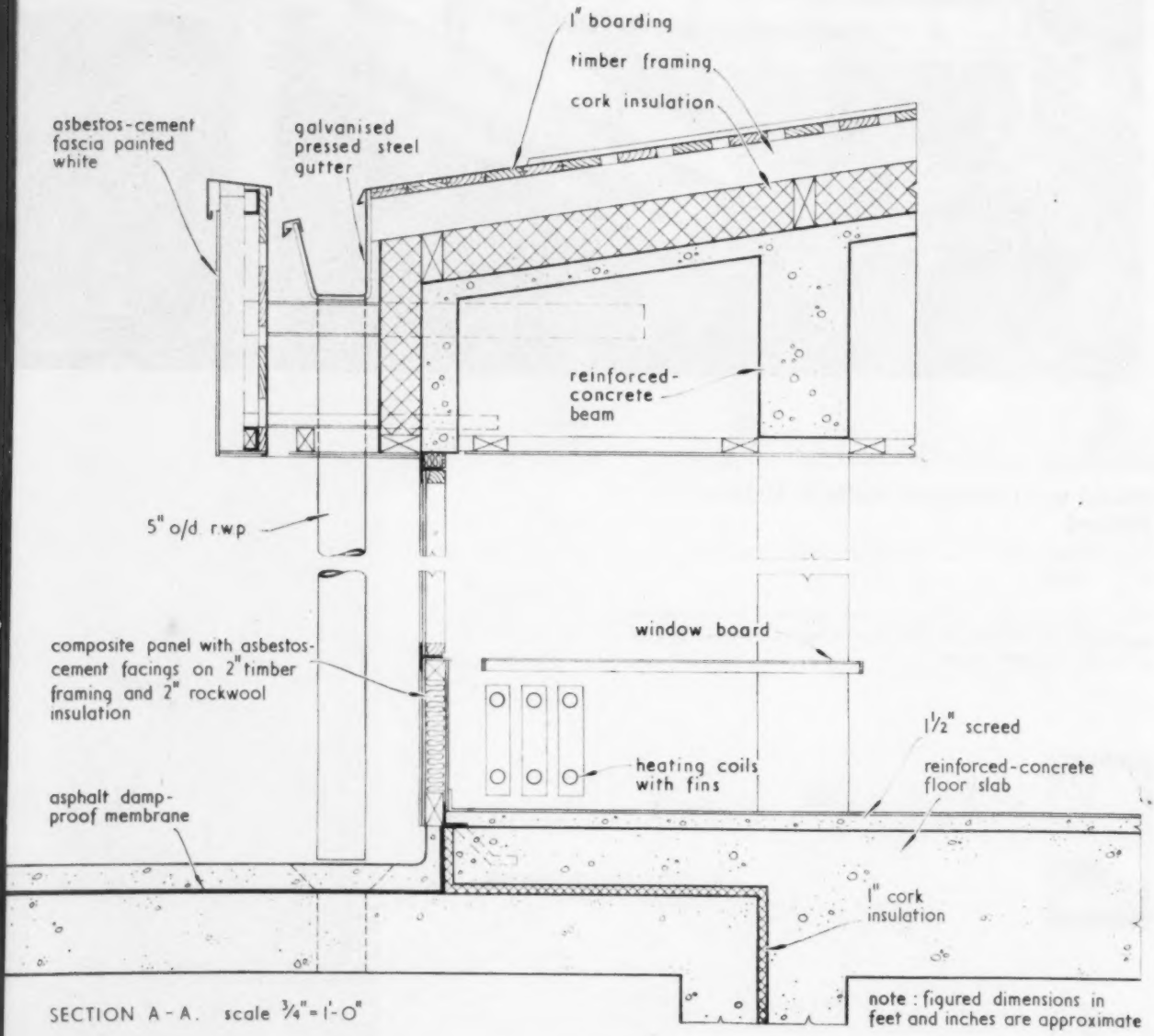
Glazed wall: Shopping centre in Helsinki, Finland

Erkki Sakari Karvinen, architect (material supplied by H. S. Sami)

This is an interesting example of how the heavy and systematic application of insulants can allow an "open" expression, even in a rigorous northern climate



ELEVATION. scale 1/8" = 1'-0"



SECTION A-A. scale 3/4" = 1'-0"

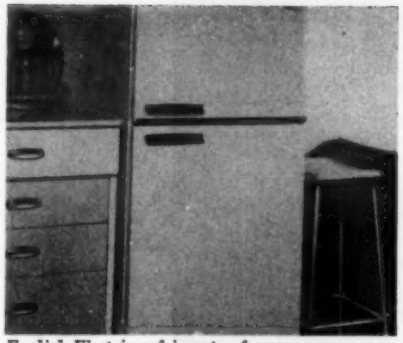
note : figured dimensions in feet and inches are approximate

SfB (73)

UDC 643·37

Another refrigerator-freezer

Following the Creda and Tricity units recently mentioned in these Notes, English Electric have announced a 4 cu ft refrigerator with a freezer compartment at the top, large enough to hold 50 lb of frozen food plus two large trays of ice cubes. Unlike the other two models, the freezer door is front and not top opening, which has the advantage that the top is left free for putting things down, though at the expense of cold air lost every time the door is opened. Price, white or cream finish, is 93 guineas, and it will be available from March next year. Floor space occupied is only 21 in by 23½ in, and the height is 49 in. The complete refrigerator is guaranteed for a year, the cooling unit for five. This is fairly common practice in the refrigerator industry, but I still find it somewhat puzzling, as I would have thought there was nothing much bar the cooling unit to go wrong. There may be some simple explanation, but I would look somewhat askance at a car with an engine guaranteed for a year and bodywork only for 10 weeks, though it is true that the car people



English Electric refrigerator-freezer

supply bits free and you pay the earth for fitting, whereas you get the whole refrigerator done free.

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

SfB (38)

UDC 696·121

Still more plastic rainwater goods

Osma Plastics, who have for some time been producing a plastics rainwater system with glass fibre reinforced polyester resin gutters, have just introduced a parallel range in pvc at a considerably lower price. The glass-fibre type is recommended for use where dimensional stability is important, particularly in tropical countries, but pvc is put forward as being perfectly adequate for normal use in this country. The pvc gutters are 3/32 in thick and are designed to take the weight of a ladder and operative: fixing is by brackets screwed to the fascia board at 3-ft centres, the gutters being snapped into position over a synthetic rubber seal, butt joints being made with a ¼-in gap to allow for expansion. There is a good range of fittings, including two sizes of rainwater head. Standard downpipe is 2½ in diameter for use with a 4½-in half-round gutter, but both pipes and gutters up to 6 in are available. Larger diameter, box, valley and boundary gutters can also be made to special requirements. Standard colours are black and light grey, but off-white, yellow, blue, green and slate grey can be produced at an extra cost of 15 per cent. The catalogue is A4 size and SfB classified.

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

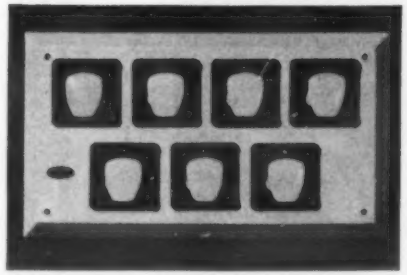
SfB (60)

UDC 621·316

Multiple electrical sockets

A number of switchgear manufacturers already produce grouped sockets which will take three or four 13 amp fused BS 1363 plugs. The Brydor board has seven outlets and is intended for use in places like kitchens and workshops where there are likely to be a lot of gadgets, none of them with loadings of more than a few hundred watts. When used in houses with a ring main supply the total loading must be kept down to 15 amps. The board is mild steel stove enamelled white and the sockets and plugs are supplied in a range of colours. Price is £8 17 6, which seems cheap enough, though I am not sure that very many people are going to want as many as seven outlets all in one place, and that it may not be better to have them split up on opposite sides of the room. Long trailing flexes are certainly a bad thing.

Brydor Products, 373 Battersea Park Rd, London SW11



Brydor seven-socket board

Products File by Brian Grant

The Industry has been replaced by Products File. Each item occupies a quarter-page (ie A6 size) and is given an SfB number so that readers may cut the page and file each under its number if they wish. Alternatively, they may tear out the whole page and file all Products File pages together. Products File pages never back on to editorial matter. Readers wanting more information from manufacturers may turn to the back page where they will find Products File items included in the lists 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.

"Calyx" designed by Joyce Storey. M.1077 shown to scale.

A new collection of machine printed wallpapers has just been compiled by the London Office of
The Wall Paper Manufacturers Limited 19/21 Mortimer Street, W.1.
and is now available through wallpaper suppliers. Many prominent designers are associated with this collection
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THE WALL PAPER MANUFACTURERS LIMITED

AJ Products File November 8 1961

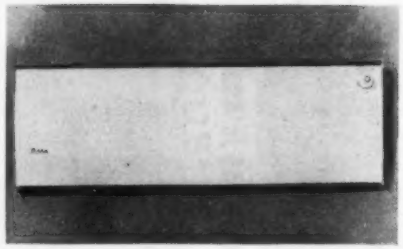
SfB (56)

UDC 697·353

Electric heating panels

The Beha range of electric heating panels is made in both panel and strip form for heating along skirting boards, and in sizes from 600 to 1,500 watts. The skirting board heaters are 6 in high and vary in length from 40 to 66 in according to their electrical loading. Wall panels are 16 in high and their length varies from 2 ft to 4 ft according to loading.
Wall panels are controlled by a six position switch to give a variable heat output, skirting strips having a three position switch, though control can of course be by separate thermostat. Heat output is 70 to 80 per cent convection. Standard finish is cream or white stove enamel, and prices vary between £9 9 and £15 4 6 including purchase tax. The makers point out that it may be possible to obtain grants for conversion in smokeless areas.

Denham & Morley Ltd, Denmore House, 173 Cleveland St, London W1



Beha heating panel

AJ Products File November 8 1961

SfB (41) V

UDC 691·57

Polyester wall finish

Versalloyd is a polyester resin which cures in a few hours without the application of heat, and which can be applied with brush, roller or spray. It can be applied to concrete, stone, plaster, asbestos cement, and many other materials, whether porous or not, and is claimed to form a permanent water-proof seal which has high resistance to both impact and abrasion.
For very porous surfaces a filler coat has been developed, and this is shown being applied in the photograph. Chemical resistance is good and the finish is tough enough for use in factories and schools where mechanical damage is likely. If structural cracks occur the finish can be repaired by patching within the area of the crack itself. The material is made in nine colours and is applied by specialist contractors.

Lloyd's Packing Warehouses (Holdings) Ltd, New Barns Works, South Langworthy Rd, Salford, Lancashire

Versalloyd wall finish

AJ Products File November 8 1961

SfB (82)

UDC

Displays in supermarkets

There is a new range of fittings, known as Vis-u-link, designed for use in all types of self service shop. The units are double-sided, and have a total depth of 36 in and a height of 50 in. Standard width is 5 ft and the units can be built up to any length of run. Shelving is adjustable in height and easily removed for cleaning. Quarter inch glass is recommended for the shelving, metal shelves have a hard blue hammer finish. The central divider is plastic faced hardboard.

Versatile Fittings (WHS) Ltd, 10 New Fetter Lane, London EC4

Vis-u-link shelf fittings

AJ Products File November 8 1961

SfB (57)

UDC 697·94

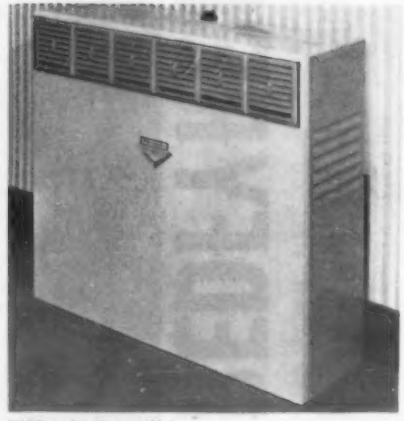
Air conditioning

The machine illustrated here is the Whispair, a self-contained floor mounted unit measuring 33 in by 10 in on plan with a height of 30 in. The circulating fans and motor are well insulated, and the machine is claimed to be very quiet. Incoming air passes through a nylon filter and the refrigeration system will extract 12,000 B.Th.U. per hour with a current consumption of 1½ units, and at the same time remove water vapour at up to 5 pints per hour. For winter heating the unit is provided with a 2 kW heater, also thermostatically controlled.

Temperature Ltd, Burlington Rd, London, SW6

The same unit is also being marketed by the GEC under the name Californian. The machines are of almost identical appearance, the only difference being that the Californian lacks the badge on the front.

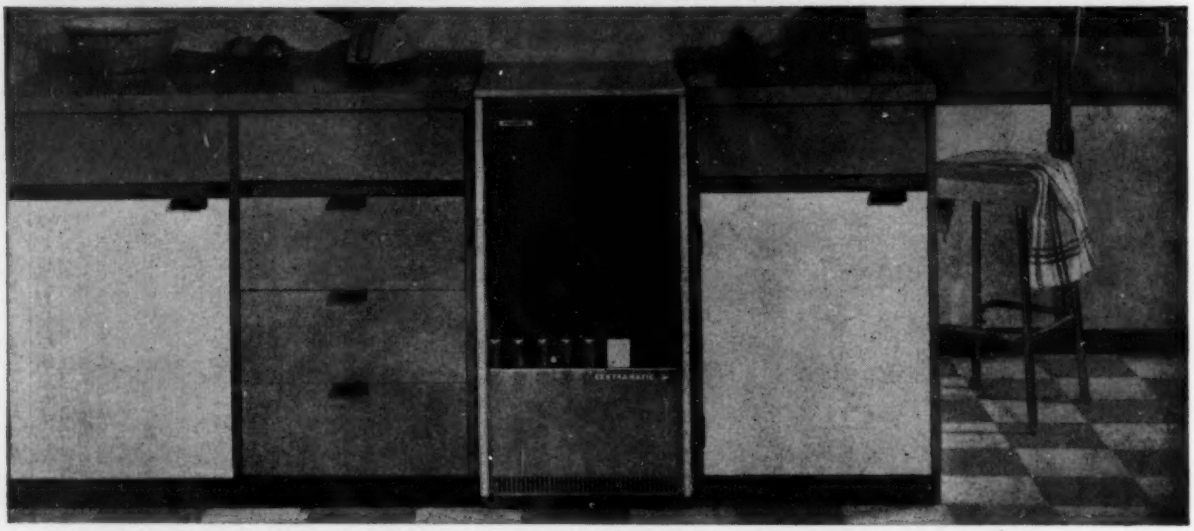
The General Electric Co Ltd, Magnet House, Kingsway, London WC2



Whispair air conditioner

From the makers of the 'Redfyre' Centramatic 50 and 80 comes the

REDFYRE CENTRAMATIC 35



fully automatic oil-fired boiler—specially designed for smaller houses

Unique automatic control system
Indicator lights on the Redfyre Centramatic 35 act as a constant reminder of the temperature selected by the user and the boiler is automatically operated to this setting by a sealed printed-circuit control unit. When the correct temperature is reached, the boiler switches itself off.

Exceptional fuel economy
When heat is needed the Redfyre Centramatic 35 lights itself electrically and reaches full operating efficiency almost at once. No pilot flame or low-pressure 'idling' to dribble away the fuel wastefully.

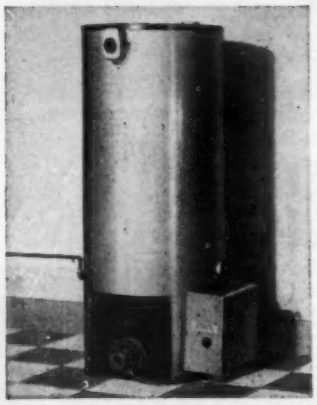
Perfect for the kitchenette
The Redfyre Centramatic 35 has dimensions to fit the smallest kitchen. The attractive enamelled casing is in white or cream; the bottom front panel is anodised aluminium; and for the easily interchangeable top front panel there is a choice of: Atlantic Grey, Nursery Blue, Eau-de-Nil, Flame Red, Cream, White, Buttercup, and Lilac. And because the 35 is totally enclosed, permanently installed, and fed with oil from outside the house, it is of course always safe.

Automatic combustion
The Redfyre Centramatic 35 does not rely on a good constant chimney draught to provide air for correct combustion. The fan on the unit does this and a 5" diameter chimney flue (top or back outlet) with some updraught is all that is needed.

Brief specification
Output — 35,000 B.Th.U's/hr. continuous rating (water transfer). Overall size — 36" high x 18" wide x 21" deep. Steel boiler with 1¼" B.S.P. tappings.

Retail price of the Redfyre CENTRAMATIC 35 is £93-9s.

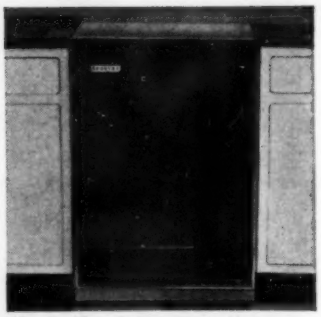
A REDFYRE CENTRAMATIC TO SUIT EVERYBODY



The Redfyre Centramatic 80

There are now three Redfyre Centramatics — the 35, described above, the 50 (50,000 B.Th.U's/hr.) price £134-8s (each of these models will fit beautifully into the kitchen) and the 80 (80,000 B.Th.U's/hr.) price £156-9s. All three Redfyre Centramatics are fully automatic and suitable for use on either gravity or small bore systems.

Mail this coupon please for full specification



The Redfyre Centramatic 50

Newton Chambers and Company Limited, Redfyre Products, Thorncliffe, Sheffield
Please send me detailed technical literature on the Redfyre Centramatic 35

NAME _____

ADDRESS _____

AJ9/11

REDFYRE

SEE THE REDFYRE RANGE ON STAND 410 ROW H AT THE BUILDING EXHIBITION

AJ SfB (98)
Building Study: 2nd Series UDC 728·1 Housing: General

Main type of accommodation is two-storey flats

Housing for Old People

at	THE TWITTENS, WEST GREEN, CRAWLEY
designed by	J. M. AUSTIN-SMITH & PARTNERS
partner in charge	GEOFFREY SALMON
assisted by	WILLIAM JARRETT AND PHILIP S. BINNS
quantity surveyors	YOUNG & BROWN who prepared the cost analysis

This building type is growing rapidly in importance, and shows considerable room for experiment. In this case the architects were asked to provide a relatively large group of independent dwellings which share a communal hall, and have achieved not only a relatively high standard of accommodation, but a most capable and sensitively handled layout

APPRAISAL

This scheme was designed before the launching of the MOHLG's current policy of recommending "flatlets" for old people, as illustrated in the booklet *More Flatlets for Old People**, published last year. The suggestion of the Ministry is that there is a case for groups of from 12 to 24 bed-sitting rooms, each one provided with its own kitchen, but with shared wcs and bathrooms. This attempt to reduce the cost of housing for old people is in some respects balanced by recommendations for such features as central heating, communal sitting-rooms, and accommodation for wardens who can provide help in case of need. It has nevertheless been violently attacked as an attempt to reduce standards, as reported in the recent technical article by Harry Chadwick (SfB (94): UDC 725.56, AJ 6.9.61) where old people voiced strong objections in a survey to any sharing of baths and wcs. The Ministry point out that the flatlets are not intended to be a substitute for one-bedroom flats or houses, but are a different form of housing for old people who are less active and thus less able to look after themselves, whilst still not in need of such care that there is no alternative to a residential home.

There is, of course, a growing demand for old people's accommodation, and the current MOHLG development project at Stevenage will provide a suitable opportunity for testing the sociological implications of the "flatlet" approach.

One of the difficulties in appraising the problem, which is not generally recognised, is the diversity of age of people who tend to be housed in what is conventionally known as "old people's dwellings." Thanks to the lowering of the average age of marriage in this country, and the much greater mobility of the population, many children leave home long before their parents have reached retiring age. It is only natural that housing authorities should wish to move such couples into "old people's dwellings" so as to release larger houses to the bigger families who are inevitably at the top of their housing lists. Thus there is equally a case for the smaller separate dwellings for those younger couples who are still active and going out to work.

The difficult decision remains, as to whether this smaller house is still suitable for the elderly, those perhaps in their eighties, who are still attempting to lead independent lives, for whom some form of emergency service is essential, and who are considerably less active. The case can thus be made for a diversity of provision under the broad heading of housing for old people, with the independent unit, the one or two-bedroom house or flat at one end of the scale, and the residential home at the other, with the Ministry "flatlets" as the intermediate type.

The objection to this type of pattern is the abrupt changes that the old person may have to undergo, involving a complete change of environment, loss of social contacts etc, in changing from one type of accommodation to another. This is heightened by the division of responsibility between local authorities for housing and that of counties and county boroughs for welfare homes for old people in need of care and attention. On the face of it, there is everything to be said in humanitarian terms, for providing housing which is suitable for a couple in their fifties, in which they can go on living as long as they can reasonably look after themselves, if possible for the rest of their lives. This is the aim of this scheme at Crawley, which provides quite separate dwellings, but adds the additional amenity of a residential warden who lives in one of the houses, and who can be summoned by an alarm bell, plus a communal hall to which is attached a small set of rooms used by guests of residents.

Another important feature of the scheme is the generosity of the units themselves. In addition to separate living rooms and bedrooms, a bed recess is provided in the living rooms for the use of visitors, or when one of a couple is ill, and it is more convenient to sleep separately. This feature of the planning is welcomed by tenants because of the flexibility it provides. It is also a major impression of the scheme that these living rooms provide a generosity of space well beyond the usual minimal plan, bearing in mind particularly that many tenants arrive from larger houses with considerable quantities of often bulky furniture which cannot easily be crammed into the prescribed Ministry area. Coupled with this sense of generosity in the living-room is a firm absence on the part of the architects of any attempt to move towards coyness, toward those patently bogus old-fo..sy and cosy features such as little sitting-out porches and peeping windows which mar so many schemes of this type. Instead, there is as far as possible an equation of this housing with the more normal type, an essentially civilised way of approaching the problem.

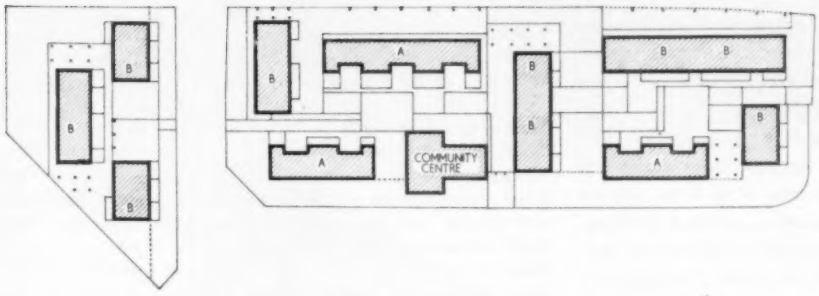
Two doubts remain about the interiors of these houses and flats. First, that there is obvious room for experiment in the relationship between living space and kitchen. Bearing in mind that a proportion of tenants are bound to be arthritic or suffer from other similar disabilities, there may be a case for allowing the dining table to be placed much nearer to cooker and sink, either by allowing enough space for eating in the kitchen, or by abolishing the kitchen altogether as a separate compartment.

Second, there is a slightly disappointing lack of quality about the detailing and finishes of the interiors. This is, perhaps, partly the result of providing space standards which are relatively very high. At the same time, however, there is the feeling that the detailing of the interiors has not received the same order of attention as the exteriors of these terraces.

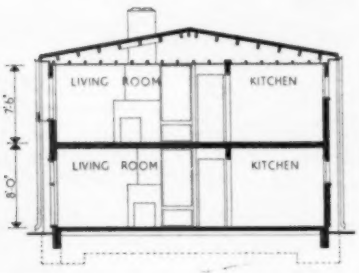
The major success of this scheme, however, is the layout that the architects have achieved. Fitting into an existing road pattern, which cuts the site in two at the north end, they have turned the housing inwards on to a series of open spaces strung together as a pedestrian way which runs from one end to the other. This has been carefully landscaped, with a varied pattern of paving, formal beds for planting, seats and subtle changes of level. In purely formal terms, this is far more successful spatially than can appear in any series of photographs. This layout also has significance in social terms. It is, of course, all too easy to draw highly emotional conclusions about this aspect of layout, but the casual visitor cannot help noticing the way in which this public area is developing as a place for natural social activity. Naturally this is all important for the very elderly, who tend to suffer isolation, insecurity and sheer boredom. One would hope that it may also stimulate a certain amount of self-help amongst the tenants in cases of temporary illness or permanent infirmity. The site is very close to nearby shops and a pub, and therefore not isolated from the rest of the community. The scheme is of course somewhat larger than normal, above the maximum size that many local authorities currently consider to be desirable. This is, however, offset by the fact that the accommodation is quite suitable for ordinary couples without families, and so that the type of tenant can be kept reasonably diverse. At the same time the pedestrian through access provides a convenient short-cut to some of the surrounding housing, and so prevents any sense of isolation.

One of the minor grumbles of a few of the tenants is that they

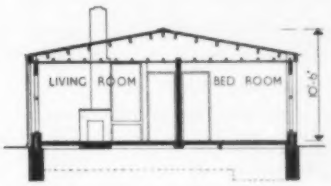
* 1960 HMSO



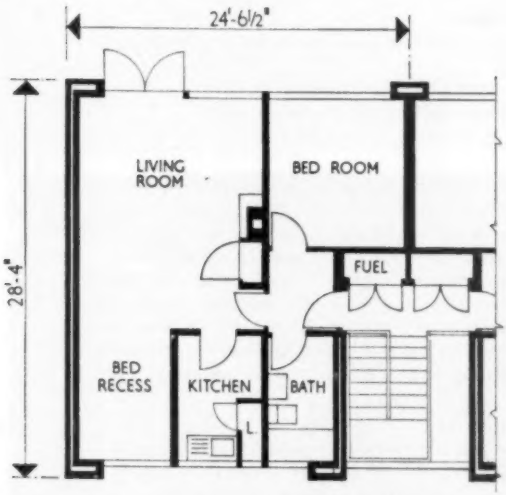
Block plan of scheme showing layout of single-storey houses (type A) and flats (type B) [Scale: $\frac{1}{16}$" = 1' 0"]



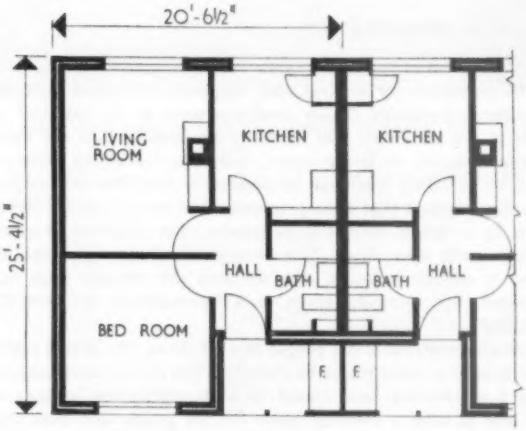
Section through two-storey block of flats
[Scale: $\frac{1}{8}$" = 1' 0"]



Section through single-storey houses

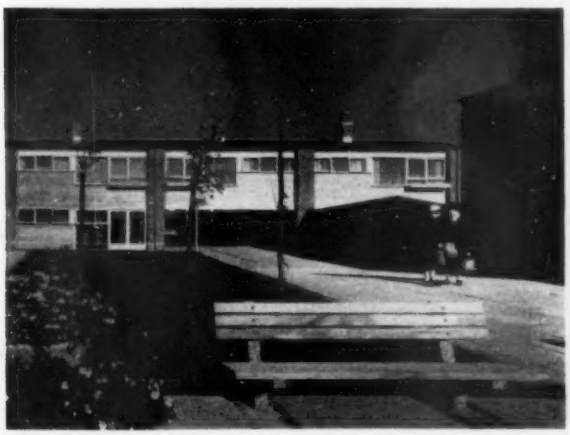


Plan of first floor flats (ground floor similar) [Scale: $\frac{1}{8}$" = 1' 0"]



Plan of single-storey houses

Layout includes careful handling of different types of paving, planting and subtly controlled changes of level



Bungalows, which are each provided with a small private forecourt

have no private gardens. These could, no doubt, have become an absorbing occupation for some of the tenants, but there are many others who would have no interest, or are too infirm. The flower boxes provided by the architects, plus in some cases a large number of unofficial ones, would seem to be a fair compromise. In addition, although it would take considerable diplomatic and organisational skill to arrange, there might well be a case for the tenants looking after some or all of the planting in the public areas, at present maintained by the local authority. The scheme remains, despite one or two minor points of criticism, a consistent and successful essay of one method of attacking the problem of housing old people. There are, of course, other techniques capable of development, such as the idea put out in a joint MOHLG and MOH circular (17.3.61), that diverse types for different stages of infirmity, such as flatlets and residential houses, might be grouped together. Carefully arranged, this would allow old people to be transferred from one type to another with the minimum of disturbance and disruption. Again, there may be a case for mixing the very old with the very young. Some such experiment might well be tried, of combining a scheme such as this with, say, a nursery school.

Certainly, this building type is still capable of immense study and development, and this scheme at Crawley, for all its excellence, should not be regarded as the only possible type of answer. But changes can only be made, and a more fluid, broad approach developed if administrators change their attitude both at local authority and Ministry levels.

CLIENT'S REQUIREMENTS

The provision of 59 old people's dwellings on two sites which were separated by a road and originally occupied by prefabricated dwellings. These dwellings were to be designed as flats to the standards laid down by the MOHLG with the basic accommodation of living room, bedroom, bathroom, kitchen and, in as many dwellings as possible within the cost target, the clients asked that a sleeping area, separated from the living room by a curtain, should be included so that a relative or a sick person could sleep there. This arrangement, which provides in effect a second bedroom, also attracts the subsidy from the Ministry, not normally given to a two-bedroom old person's dwelling.

To enable relatives of old people to visit them, the clients asked that a suite of guest rooms be included. The clients were anxious that a community hall should be built within the confines of the site to offer a meeting place for old people and that this should be easily accessible both from within the site and outside.

SITE

The site slopes down from south to north and at an average slope of 1 in 120, and was therefore not ideal for old people. The public path also runs from north to south and gives the site its name, The Twittens (Anglo-Saxon for "the way across"). The site is surrounded by two-storey housing and the clients did not wish that the heights of the new dwellings should be in contrast to those surrounding. A shopping centre and public house are within one minute's walk.

PLANNING AIMS

The architects' aim was to obtain as closely knit a layout, as possible, with the dwellings looking towards its centre rather than outwards on to the surrounding roads and houses. They maintained the way through the site to encourage people to walk through it and thus avoid the feeling of isolation by the old people.

The main site is thus divided into two courtyards, off the northernmost of which are the community hall and guest rooms. Fuel sheds were made an integral part of the dwellings.

SUMMARY

Total floor area, single-storey house: 5,732 sq ft.
Floor area of flats: ground floor area: 11,239 sq ft; total net habitable, 23,013 sq ft; gross area, 24,886 sq ft.
Type of contract: Lump sum with fluctuations.
Tender date: June 1958.
Work began: October 1958.
Work finished: April 1960.
Final contract price of foundation, superstructure, installation and finishes including drainage to collecting manhole: single-storey houses, £15,345 0s 10d; flats, £51,012 3s 0d.
Final contract price of external works and ancillary buildings, including drainage beyond collecting manhole: £13,576 16s 9d.
Total: £79,934 0s 7d.

COST ANALYSIS OF FLATS

Based on final contract price (AJ revised elemental breakdown in use from November 10 1960).

	Cost per sq ft s d
Preliminaries and insurances 9·94 per cent of remainder of contract.	5 0½
Work below lowest floor finish Edge beams and strip foundations, 4-in concrete ground floor slab on hardcore.	3 11½

STRUCTURAL ELEMENTS

Upper floors Patent precast plank and pots with in situ concrete filling. 10-in floor; 60 sq yd, 74s 6d per sq yd. 6-in. floor; 1,363 sq yd, 35s 5d per sq yd.	2 1½
Roof Softwood rafters, purlins and ceiling joists secured with straps and wires finished with patent aluminium roofing on softwood battens. Cost includes layer of building paper under roof, glass fibre quilt over ceiling joists, softwood fascias and barge boards, aluminium gutters and down pipes and gable ends and other brickwork and partitions in roof space; 1,694 sq yd, 77s 0d per sq yd. Softwood canopy with hardboard and felt covered top and asbestos soffit; 44 sq yd, 62s 0d per sq yd.	5 10
Staircases Precast concrete sectional staircase and landing finished with coloured granolithic and mild steel balustrade with hardwood handrail and middle rail. *No of staircases* — *Width* — *Total rise* 12 — 3 ft 0 in — 8 ft 0 in	10½
External walls 4½-in grey wirecut facings, 2-in cavity and inner-leaf of 4-in lightweight concrete block. 4-in lightweight concrete block finished with glass fibre quilt, building paper and impregnated Baltic Redwood battens and weatherboarding. 9-in party wall in commons. Cost includes lintels, cavity damp proof courses, chimney breast, stack and chimney pots and infill panels of plywood adjoining windows.	6 7½
Windows Softwood frames and opening lights and hardwood external sub-sill, clear sheet and narrow reeded glass (includes casement doors); 5,122 sq ft, 7s 11d per sq ft.	1 9½
External doors No of doors: 43 single. Flush solid core with softwood frames and hardwood thresholds; 906 sq ft, 5s 9d per sq ft.	2½

Looking south from under the 2-storey block which divides the site

Group at north end of site, separated from the remainder by an existing road

West side of scheme

	s	d
Partitions 4½-in walls in commons, 2-in lightweight concrete block, 4-in lightweight concrete block. Cost includes lintels.	1	3½
Internal doors No of single: 301. No of double: 44. Flush skeleton framed doors and softwood linings and architraves and plywood infill panels; 6,644 sq ft, 4s 0d per sq ft.	1	1
Ironmongery Anodised aluminium generally.		6½
Total of structural elements: 20s 4½d.		

FINISHES AND FITTINGS

	s	d
Wall finishes 2 coats of plaster; 1,540 sq yd, 5s 1d per sq yd. Plasterboard; 84 sq yd, 4s 9d per sq yd. White glazed wall tiling and screed in splashbacks; 41 sq yd, 61s 0d per sq yd. Rendering: 314 sq yd, 6s 7d per sq yd.	1	5½
Floor finishes Coloured pitch mastic flooring and softwood skirting; 1,150 sq yd, 13s 7d per sq yd. Thermoplastic tiles on screed and softwood skirtings; 1,166 sq yd, 17s 9d per sq yd. ¾-in coloured granolithic; 59 sq yd, 11s 10d per sq yd. 1-in colour granolithic; 146 sq yd, 12s 10d per sq yd.	1	8¾
Ceiling finishes Plaster; 1,152 sq yd. Aluminium-backed plasterboard; 1,203 sq yd. Rendering; 122 sq yd. ½-in asbestos; 232 sq yd.		10
Decorations Gloss paint on wood and metalwork, water paint generally on walls with some areas of emulsion and gloss paint, water paint on ceilings.	2	0
Fittings Softwood shelving, cloak rails and small sundries, fire place surround and hearth and fireguards (excludes interiors and back boilers), curtain tracks, pipe casings, precast concrete shelves, window boxes, fuel and bin stores (excluding brickwork).	1	3½
Total of finishes and fittings: 7s 3½d		

SERVICES

	s	d
Sanitary fittings	1	6

Type	*No of each type*
White vitreous china lavatory basins	43
White vitreous enamel wcs and plastic seats	43
Porcelain enamelled sinks and drainers	43
Porcelain enamelled baths and side panels	43

Waste, soil and overflow pipes Patent copper traps and steel multi-branch soil units, asbestos cement vent pipes and copper waste and overflow pipes.		8½
Cold water services Insulated patent combined cold and hot storage tanks, polythene and copper rising main, distribution pipes and overflow. No of draw-off points: 301. Includes builder's work.		4½
Hot water services Fire interior and back boiler, copper distribution pipes No of draw-off points: 129. Includes builder's work.	1	8¾
Gas services Supply to cooker, wash boiler and sink water heater (fittings not included) and fire ignition points. No of outlets : 172. Includes builder's work, ½d.		5½
Electrical services	1	10½

Type of point	*No of each type*
Ceiling points	258
13-amp socket outlets	172
30-amp cooker points	43
15-amp immersion heater circuits (heaters not included)	43
Time switch lighting points	25

Includes builder's work, 1d.

Special services		9

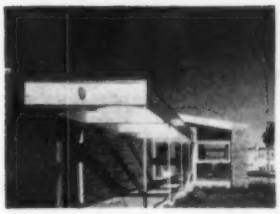
Alarm bell points	42
56-way indicator	1
Television aerial points	43

Includes builder's work, 3d.

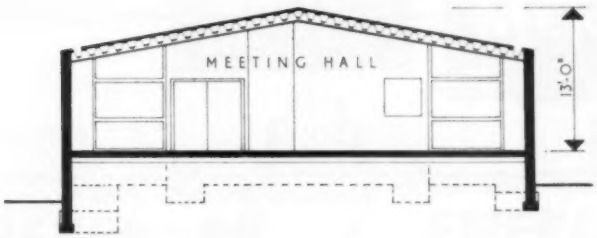
Drainage		4½
Total of services: 7s. 8½d.		

Central court, with communal hall on the left

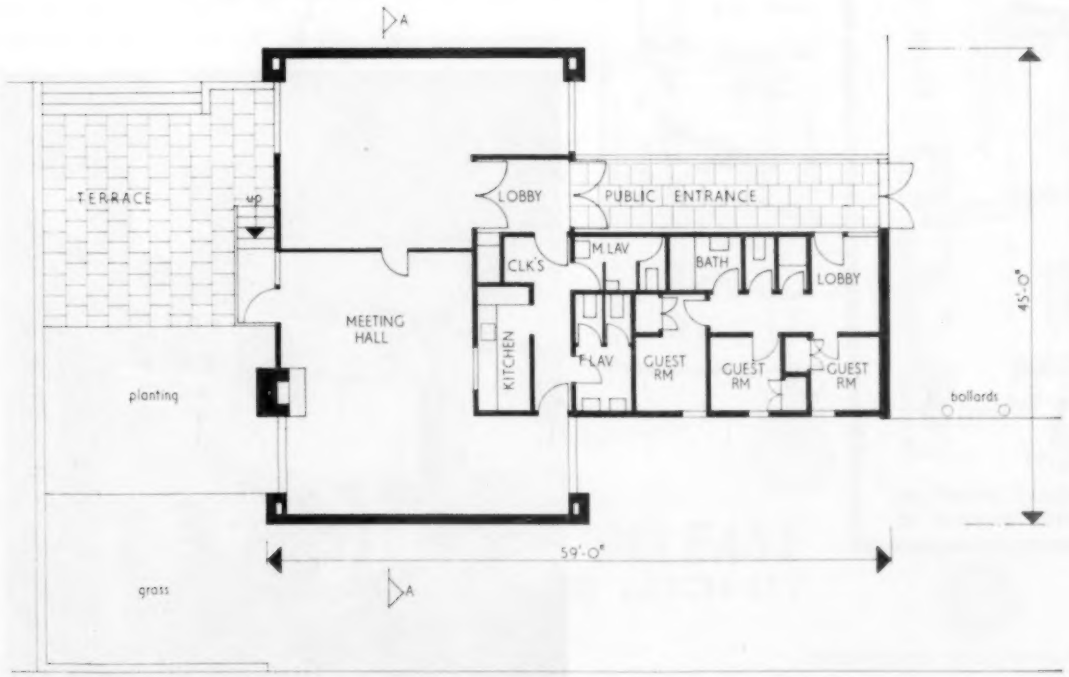
North side of communal hall



Community hall entrance, and right, interior of communal hall



Section through meeting hall [Scale: $\frac{1}{16}$" = 1' 0"]



Plan of meeting hall, with guest room wing, showing communal space divided by sliding folding partition. [Scale: $\frac{1}{16}$" = 1' 0"]

Total per sq ft of floor area based on net habitable area: s d

£51,012 (net cost excluding external works) = 44 4

23,013 sq ft (net habitable area)

COST ANALYSIS OF BUNGALOWS

Based on final contract price (AJ revised elemental breakdown in use from November 10 1960).

Cost per sq ft

Preliminaries and insurances 5 0½

9·94 per cent of remainder of contract.

Work below lowest floor finish 8 7½

Edge beams and strip foundations, 4-in concrete ground floor slab on hardcore.

STRUCTURAL ELEMENTS

Roof 10 5½

Softwood rafters, purlins and ceiling joists, secured with straps and wires finished with patent aluminium roofing on softwood battens. Cost includes layer of building paper under roof, glass fibre quilt over ceiling joists, softwood fascias and barge boards, aluminium gutters and down pipes and gable ends and other brickwork and partitions in roof space; 890 sq yd, 67s 0d per sq yd.

External walls 7 0

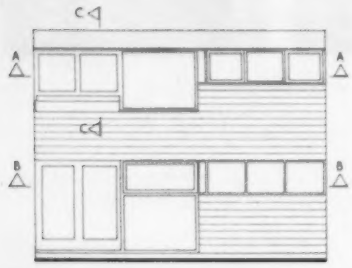
4½-in grey wirecut facings, 2-in cavity and inner leaf of 4-in lightweight concrete block.
9-in party wall in commons.
Cost includes lintels, cavity damp proof courses, chimney breast, stack and chimney pots and small insulated infil panels of plywood adjoining windows.

Windows 1 6

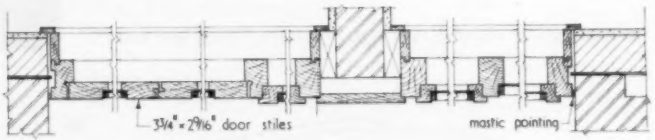
Softwood frames and opening lights and hardwood external sub-sill, clear sheet and narrow reeded glass; 1,223 sq ft, 7s 0d per sq ft.

External doors 4½

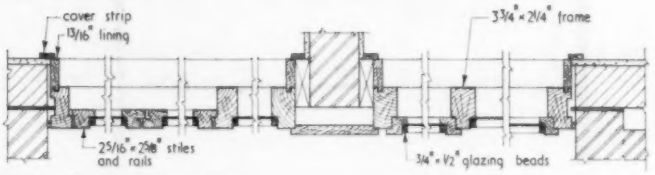
No of doors and fanlights: 14 single.
Flush solid core with softwood frames and fanlights



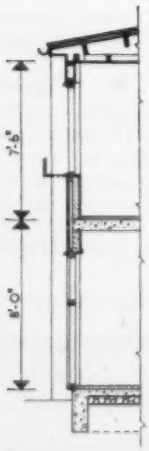
Key elevation
[Scale: 1/16" = 1' 0"]



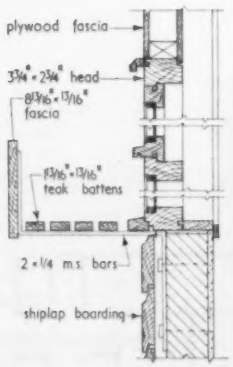
Plan at A



Plan at B [Scale: ½" = 1' 0"]



Key section
[Scale: ½" = 1' 0"]



Section C, showing window box

Details of window walls to two-storey flats

Garden frontage of two-storey flats

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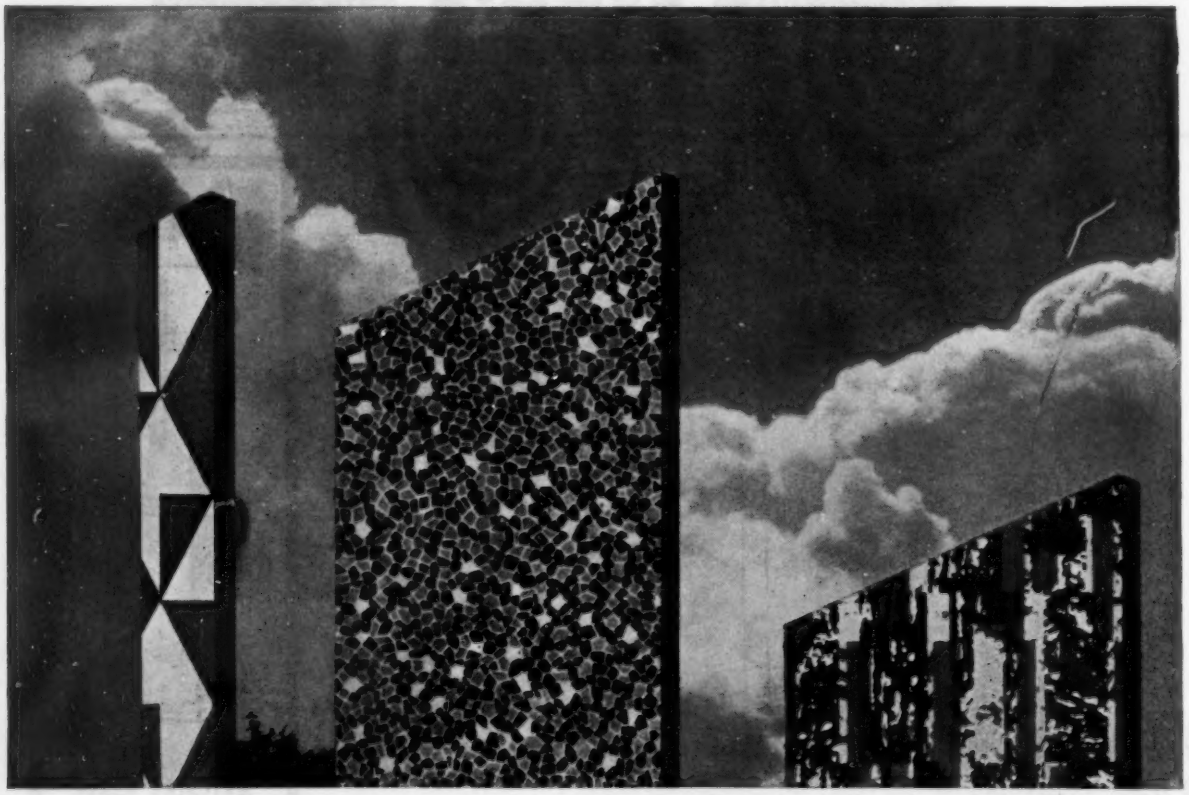

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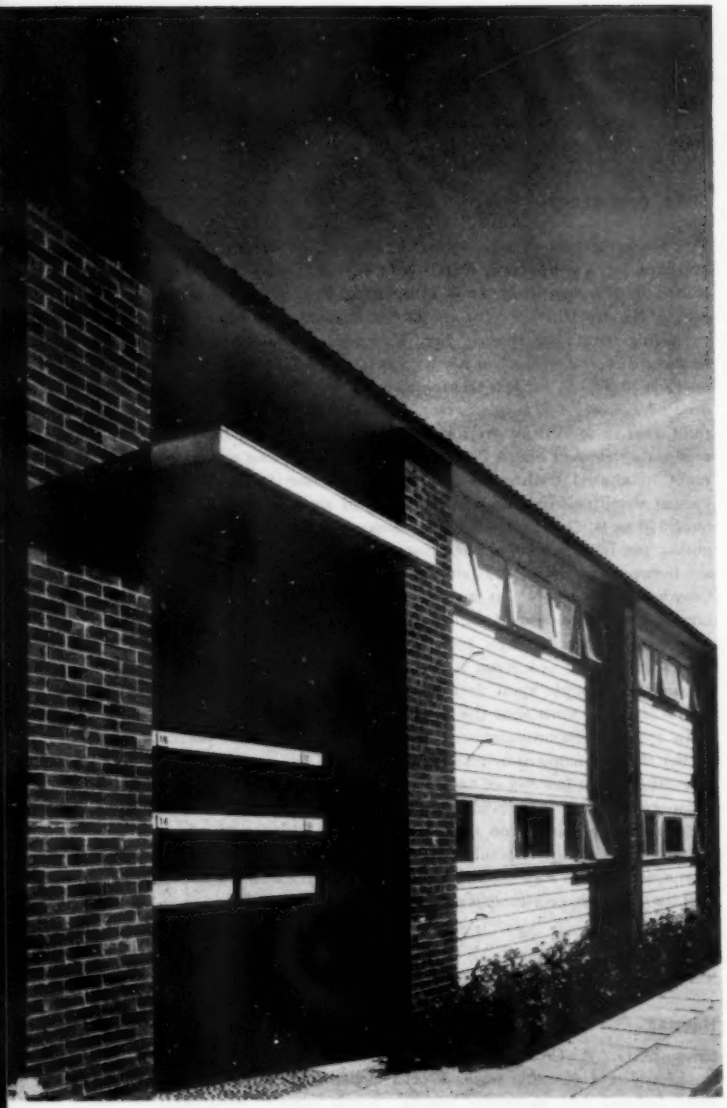


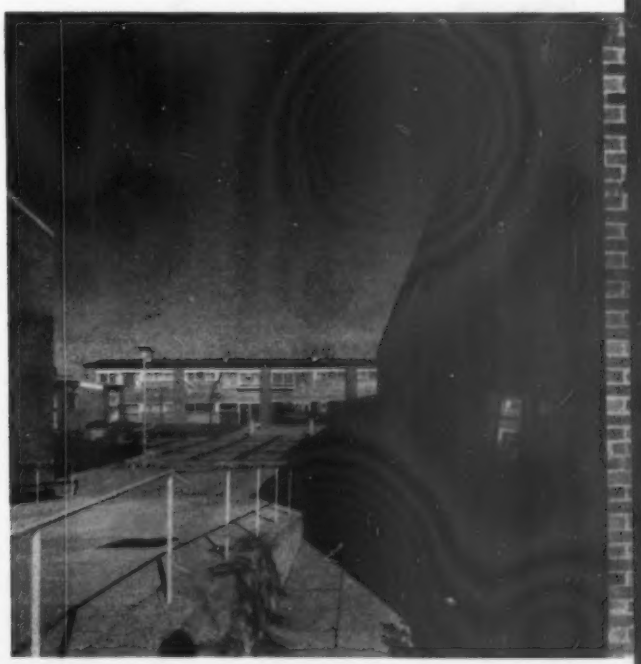
	s	d
and hardwood threshold, clear sheet glass to fanlights; 367 sq ft, 6s 3d per sq ft.		
Partitions 4½-in walls in commons, 2-in lightweight concrete block, 3-in lightweight concrete block. Cost includes lintels.	1	6½
Internal doors No of single: 98. No of double: 14. Flush skeleton framed, softwood linings and architraves, plywood infill panels; 1,675 sq ft, 4s 0d per sq ft.	1	2
Ironmongery Anodised aluminium generally.		7½
Total of structural elements: 22s 8½d		

FINISHES AND FITTINGS

Wall finishes 2 coats of plaster; 1,540 sq yd, 5s 1d per sq yd. Plasterboard; 29 sq yd, 4s 9d per sq yd. White glazed wall tiling and screed in splashbacks; 14 sq yd, 63s 3d per sq yd.	1	7½
Floor finishes Coloured pitch mastic flooring, softwood skirtings; 632 sq yd, 13s 8d per sq yd.	1	5½
Ceiling finishes Aluminium-backed plasterboard; 609 sq yd, 7s 10d per sq yd.		10
Decorations Gloss paint on wood and metalwork, water paint on walls generally, with some areas of emulsion and gloss paint, water paint on ceilings.	2	3½

Open staircase access to first floor flats

South court



	s	d
Fittings	1	10½

Softwood shelving, cloak rails and small sundries, fire-place surround and hearth and fireguards (excluding interior and back boiler), curtain tracks, pipe casings, precast concrete shelves, fuel store and yard screen (excluding brickwork).

Total of finishes and fittings: 8s 1d

SERVICES

Sanitary fittings — 1 11½

Type	*No of each type*
White vitreous china lavatory basins	14
White vitreous enamel wcs and plastic seats	14
Porcelain enamelled sink and drainer	14
Porcelain enamelled baths and side panels	14

Waste, soil and overflow pipes — 11½

Patent copper traps and steel multi-branch soil units. Asbestos cement vent pipes, copper waste and overflow pipes.

Cold water services — 5½

Insulated patent combined cold and hot storage tanks. Polythene and copper rising main, distribution pipes and overflow.
No of draw-off points: 56.
Includes builder's work.

Hot water services — 1 9½

Fire interior and back boiler, copper distribution pipes.
No of draw-off points: 42.
Includes builder's work.

Gas services — 7

Supply to cooker, wash boiler and sink water heater (fittings not included) and fire ignition points.
No of outlets: 56.
Includes builder's work, ½d.

Electrical services — 1 7

Type of Point	*No of each type*
Ceiling points	70
13-amp socket outlets	42
30-amp cooker points	14
15-amp immersion heater circuits (heaters not included)	14

Includes builder's work, 1d.

Special services — 11½

Alarm bell points	28
Television aerial points	14

Includes builder's work, 3½d.

Drainage — 10

Total of services: 9s 1½d

Total cost per sq ft of floor area:
£15,345 (net cost excluding external works)
5,732 sq ft (measure inside external walls) = 53 6½

External works — 9 5½

(costs expressed per sq ft of the total net habitable area of the scheme)

	s	d
Planting and landscaping		8½
Paths and paved areas	4	1
Walls, fences, seats	1	7
Drains beyond the buildings	2	1½
Land drains		3½
Other service connections		7½

	s	d
Communal hall	5	9½

Total net floor area of 1,660 sq ft at 100s 11d per sq ft
This building was carried out separately by another contractor

COST COMMENT

The MOHLG policy of advocating "flatlets" with shared baths and wcs for a proportion of old people has already been mentioned in the appraisal. It is interesting that the average net cost given by the Ministry in its publications for such units, excluding common rooms, but including centrally supplied heating and hot water, is about £813, in comparison with an average of £1,164 for this scheme as a whole. The Ministry units are, of course, for single-person occupation, and the designs published in More Flatlets for Old People have a net habitable area on average of about 275 sq ft per unit (including apportionment of shared bathrooms etc), in comparison with the two-person dwellings in this scheme with an average area of just over 500 sq ft. On this basis, the scheme costs no more in capital outlay per head, provided that just over a third of the dwellings are occupied by couples. It should be noticed, however, that the Crawley scheme does not include central heating or hot water, nor is there enclosed circulation to communal facilities. But despite the much more generous living accommodation at Crawley, it does not seem to be a more expensive method of housing old people than flatlets. This is really in confirmation of the Ministry view that the aim of the flatlets is to achieve the right type of accommodation for the more infirm single person, rather than to achieve overall economies.

The other main interest of this pair of analyses, of course, is the comparison that it provides between single and multistorey construction of the same type. Despite the added cost of circulation outside the habitable area of the flats, they are a useful case study of the way in which the two-storey construction can still be the more economical solution.

CONTRACTORS

Housing

General: G. T. Crouch Ltd. *Sub-contractors and suppliers—Supplying and planting trees:* Worth Contractors. *External and street lighting and electricity supply:* South Eastern Electricity Board. *Electrical:* Buchanan & Curwen Ltd. *Communal television system:* Belcher (Radio Services) Ltd. *Aluminium roofing:* Fural Ltd. and Roberts Adlard & Co. Ltd. *Gas services:* South Eastern Gas Board. *Thermoplastic flooring:* Gabriel Floors Ltd. *Precast concrete flower pots:* Mono Concrete Co. Ltd. *Panel types and clear plastic panels:* Parco Industries. *Ironmongery:* G. & S. Allgood. *Precast concrete bollards:* Manorcrete Ltd. *Sanitary fittings and ironmongery:* Rownson, Drew & Clydesdale Ltd. *Storage tanks:* Rolyat Tank Co Ltd. *Concrete floor planks and blocks:* Atlas Stone Co Ltd. *Waste traps:* Econa Modern Products Ltd. *Grey wirecut facing bricks:* Richard Parton Ltd. *External boarding:* Bailey & Whites Ltd and H. D. Sinclair Ltd. *Insulating load-bearing blocks:* Lignacite Ltd. *Fibre glass insulation:* Fibreglass Ltd. *Number plates:* The Supersine Co Ltd. *Floor tiles:* Hall & Co Ltd. *Paints:* Keystone Paint & Varnish Co Ltd. *Water supply:* North West Sussex Water Board.

Community Hall

General: Cox (Public Works) Ltd. *Sub-contractors and suppliers—Hardwood flooring:* A. Vigers Sons & Co Ltd. *Television system:* Belcher (Radio Services) Ltd. *Roof decking:* H. Newsum Sons & Co Ltd. *Electrical:* Buchanan & Curwen Ltd. *Roofing:* Roberts Adlard & Co Ltd. *Sliding folding partition:* Esavian Ltd. *Ceiling panels:* Anderson Construction Co Ltd. *Ironmongery:* G. & S. Allgood. *Metal faced plywood compartments and veneered plywood panels:* Venesta Plywood Ltd. *Sanitary ware:* John Knowles & Co (London) Ltd.

AJ SfB (16)

Foundations

James Armstrong is a senior engineer with the consulting engineers A. J. and J. D. Harris for whom he is responsible for a number of projects in this country and abroad. He is particularly interested in the design of buoyant basement foundations.

(16) *Foundations: General*

The subject of this week's Element Files includes all forms of supporting substructure to buildings and methods of subsoil improvement such as chemical consolidation, with the exception of retaining walls which are covered in section sfB (13). The second file is numbered sfB (17)-(19) and at this stage is intended to contain the whole group of sfB subdivisions of the subject.

The Element Design Guide is classified as sfB (16) and gives a design procedure for foundations generally. The six AJ Information Sheets are given their correct classifications and deal respectively with general design considerations, strip and pad footings, raft foundations, short bored piles; all for light foundations, with two sheets giving data to assist the architect in the choice of piling systems. A Technical Study is not included in this file as it is felt that the material prepared by the author is best presented in the form of Information Sheets.

AJ **SfB (16)**

Element Design Guide **UDC 624·15 Foundations: General**

(16) Foundations : 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		
OBTAIN HISTORICAL DATA ON SITE		**SfB (11) Ground: General** EDG para 4-7 *BRITISH STANDARDS INSTITUTION: CP 2001:1957 Site investigation, p 21, 22, 25 [Ca]. *Good general reference*
1 **Previous buildings**	WHEN DEMOLISHED DETAILS OF STRUCTURE ANY RECORDED DIFFICULTIES: during construction, after completion	Adjacent landowners, local authority, contractors
2 **Previous earthworks**	WHEN COMPLETED HOW CARRIED OUT MATERIAL USED ANY RECORDED SETTLEMENTS DEEP EXCAVATIONS MINERAL WORKINGS DISUSED AND INFILLED PONDS AND WATERCOURSES	As above, also Mineral Valuer
3 **Existing buildings**	WHEN BUILT ANY SETTLEMENT TYPE OF FOUNDATION USED ANY CONSTRUCTION PROBLEMS	Owner's architect
4 **Local authority**	POSITION OF SERVICES AVAILABLE SUBSOIL DATA TYPES OF FOUNDATION USED LOCALLY ANY LOCAL BY-LAWS	Local authority, public utilities; architects, engineers and contractors with local information
TOPOGRAPHICAL		
5 **Site survey**	CONTOURED PLAN EXISTING BUILDINGS special attention to basements LIMITS OF SLOPES—within 20 yards POSITION OF TREES—within 20 yards WATERCOURSES—within ½ mile PONDS AND LAKES—within ½ mile QUARRIES—within ½ mile ADJACENT BUILDINGS—within 300 yards RAILWAYS AND ROADS—within 300 yards WELLS—within ½ mile	**SfB (11) Ground: General** Element Design Guide paras 1-7 *INSTITUTION OF CIVIL ENGINEERS: Code of Practice No 4 (1954). Foundations, p 18 [(16)] *CP2001:1957 p 21, 22, 25 [Ca]. *Good general reference* *Site surveys should be extended beyond the limits of the area to be developed to include structures or topographical features which may affect or be affected by proposed new construction. Approximate range of influence of items listed is given opposite*
SOIL MECHANICS		
6 **Site exploration Existing data**	GEOLOGICAL SURVEY LOCAL AUTHORITY RECORDS LOCAL MINERAL WORKINGS RECENT WELL BORINGS ADJACENT OPEN EXCAVATIONS ADJACENT CUTTINGS	**SfB (11) Ground: General** EDG para 9

7 New investigations	Advisability: average loading intensity exceeds ½ ton/sq ft ground very poor: *peat* *marsh* *fill* *alluvial silt* column loads high and dispersed structure sensitive to settlement excavations exceed 5 ft deep no local information available	**SfB (11) Ground: General** EDG para 8 *LCE CP4 (1954) p 18-21. [(16)]. *Good general reference* **BS CP 2001:1957 [Ca] *Complete specialist reference* *HENRY, F. D. C., The design and construction of engineering foundations, p 26-34. London, 1956, Spon. O/P [(16)] *Good general reference* ***TERZAGHI, K. and R. B. PECK, Soil mechanics in engineering practice, chap 7. New York, 1960, John Wiley and Sons, London, 1960, Chapman and Hall [Ca] *Loading intensity: load divided by area* *Average loading intensity: total dead plus live loads divided by total area of building*
8 Execution	TRIAL PITS: may be used if load not more than 1,200 lb/sq ft, subsoil known to be reliable, own staff experienced in interpretation COMMERCIAL INVESTIGATIONS: require employment of experienced contractor, availability of all other data (*historical, topographical, geological, structural*), alternative quotations, programme before starting work	*NICHOLLS, R. A. Soil investigation for the smaller project. AJ October 4 1961, p 541-548 [(**11**)]
STRUCTURAL **9 Consider foundations in relation to overall design**		*Structural form and massing of buildings, and their disposition on site and relative to one another, may be partly determined by foundation problems and sub-soil conditions*
SOUND ROCK	building size and arrangement not critical avoid extensive excavations	*Initial sketch design may require modification to allow economic design of foundations*
ESTUARINE DEPOSITS	SOFT SILT AND CLAY less than 80 ft thick over firm strata: piling required for all medium and large buildings group loads for economy spread loads to suit light raft foundations exceeding 80 ft thick: piles expensive except for large structures basements may be advantageous to provide flotation building masses should be balanced or divorced to reduce differential settlement	*Where foundation costs are potentially high it is frequently most economical to consider multi-storey development on expensive foundations* *In such circumstances the recommendations of a foundation engineering consultant should be obtained during earliest stages of design (see paras 21-22 below)*
	SANDS AND GRAVELS settlements take place during construction low and medium buildings—disperse loads as much as possible; avoid excavation if ground water table high high buildings—concentrate loads to suit piles	
GLACIAL DRIFTS	building size and arrangement not critical disperse loads to suit spread footings piling and excavation difficult if large boulders are present	*Drift: geological term describing material deposited by glacial action and not originating in its present location*
CLAYS	normal and over-consolidated: long-term settlements likely balance or divorce masses to permit differential settlement basements help to reduce net bearing pressures piling will be necessary for large buildings	*Over-consolidated clay: clay subjected in its geological history to overburden pressure, usually of higher shear strength than normal clay, but may decrease in strength if over burden removed, eg in cuttings* *Pressure—gross: total imposed load divided by area of application* *Pressure—net: total imposed load minus weight of excavated material divided by area of application*
SOFT ROCKS	building size and arrangement not critical to about five storeys: high buildings may require thick raft foundations avoid basements to economise on excavation allow for removing and filling any very soft rock exposed during excavation	
PEAT AND MARSH	all buildings may require piling excavation very difficult and expensive	

FILL	all buildings may require piling, excavation may be very difficult, buildings on spread foundations should incorporate divorcements to avoid damage by differential settlement	
TYPE OF BUILDING 10 **Shape**	PLAN: column distribution and size, wall distribution and size, floor distribution and size, new earthworks and excavations, new pools, location of ducts, new trees SECTION: changes of level (relate to survey), ground floor details, depth of ducts, earthworks and excavations, retaining walls	**SfB (2) Structures: General.** EDG paras 26-30 *ICE CP 4 (1954) p 25-26 [(16)]
11 **Loadings**	VERTICAL: column loads, wall loads, floor loads (all dead and live), negative loads (ground water etc) HORIZONTAL: retaining walls, basement walls, arch and frame thrusts, inclined columns, wind loads BENDING MOMENTS: retaining walls, basement walls, arch and frame reactions, fixed ended columns, cantilever slabs and beams	**SfB (2) Structures: General.** EDG paras 11 and 12, and Provisional Design para 40 ICE CP 4 (1954) p. 25 [(16)] *Good general reference* *The degree of fixity required by the structural designer for columns or walls should be agreed*
12 **Other design factors**	SENSITIVITY TO SETTLEMENT WEATHERING: rainfall, temperature range, prevailing wind LOAD FLUCTUATIONS: warehouses, silos, storage tanks, vibration USE OF LOCAL MATERIALS: masonry, brickwork, fill WATERPROOFING EXPOSED FINISHES SERVICES—levels, sizes, entry and exit of: *water supply, drainage, GPO, gas, electricity, special (eg steam, laboratory services etc)*	**SfB (2) Structures: General,** EDG Constructional Factors paras 20-22 *ICE CP 4 (1954) [(16)]. *Good general reference* *HENRY, p 155-160 [(16)]. *Good general reference* *SKEMPTON, A. W. and D. MACDONALD, The allowable settlement of buildings. *Proceedings of the* ICE 1956, Part III, 5 (3) (December) p 727-784. (Structural Paper No 50) [(16)]. *Complete paper of great general interest, might be left to specialist* ***CROCKETT, J. H. A. Vibration control in piling and blasting. *Reinforced Concrete Review* 1959, 5, (2) (June) p 99-137 [(17)] **CROCKETT, J. H. A. Vibration control in machine foundations. *Reinforced Concrete Review* 1960, 5, (6) (June) p 329-367 [(33)]

Basic design decisions

13 **Assess soil type and capacity**	Reference should be made to the AJ Information Sheet 1021 Foundations for light structures 1: Selection of types	*ICE CP 4 (1954) p 27-37 [(16)]. *Good general reference* **BS CP 2001:1957. Appendices C, D and E [Ca]. (E gives a method for airfields which is applicable to soils in general) ***HENRY, p 34-43 [(16)]
INTERPRETATION	FACTUAL REPORT FIRST SPECIALIST RECOMMENDATIONS: is own staff experienced? are contractors' engineers experienced in foundation work? independent consultant	**SfB (11) Ground: General,** EDG para 21-23
FOUNDATION SELECTION	choice based on soil type and capacity	AJ Information Sheet No 1021. Foundations for light structures. 1: Selection of types [(16)]
14 **sound rock**	spread footings suitable for all structures with downward loads special anchorages required for tension loading—*drilled cable holes, rock bolts (mining)*	*ICE CP 4 (1954) p 29-31 [(16)] **HENRY, p 145-154 chap 5 [(16)]

15 **Estuarine deposits**			
SOFT SILT AND CLAY	site investigation essential		**ICE CP 4 (1954) p 34-36 [(16)]
	Less than 80 ft thick:		
	driven piles for loading intensities exceeding 500 lb/sq ft		**ICE CP 4 (1954) p 46-83 [(16)] **HENRY, chap 8 ([16)]
	large spread or raft footings for smaller loads—check settlements		**HENRY, chap 4 [(16)] ***HENRY, chap 5 [(16)] ***GIBSON, D. E. E. Buildings without foundations *RIBA Journal* 1957, 65 (2) (December) p 47-49 complete [(16)] ***TERZAGHI, K. Evaluation of coefficients of subgrade reaction. Harvard soil mechanics series 51. *Geotechnique*, 1955, 5 (4) (December) p 297-326 [(Ca5)] complete ***TERZAGHI and PECK, p 443-454 [Ca] complete
	More than 80 ft thick:		
	compare piles with buoyant basement type foundation: *check major load variation, employ foundation specialist*		
SANDS AND GRAVELS			*ICE CP 4 (1954) p 31-34 [(16)]
	investigation includes penetration tests		
	spread footings normally suitable		**HENRY, chap 4 [(16)]
	driven piles possible for high loads		**HENRY, chap 8 [(16)]
	consider vibroflotation in loose sand		*Vibroflotation may be of value in artificially compacting loosely deposited sands and light gravels. It consists essentially of a long vertical vibrator jetted into the sand and vibrated during withdrawal to provide a degree of compaction, thereby increasing the safe bearing capacity of the soil. A general lowering of the site level results from this treatment* *HENRY, p 201 [(16)] **TERZAGHI and PECK, p 379 [Ca]
	ground water level important:		
	within five feet of foundation:		*ICE CP 4 (1954) p 24 [(16)]
	half permissible bearing pressure		
	above foundation or excavation level:		
	half permissible bearing pressure		
	consider water lowering problem		*ICE CP 4 (1954) p 131-136 [(16)]
	beware running sand—loose single size sand worst		*But this may be left to specialist*
	well below foundation level: *no special problems, unlined bored piles impracticable*		
16 **Glacial drifts**	firm to stiff clays		*ICE CP 4 (1954) p 34-35 [(16)]. *Good general reference*
	sometimes very high gravel content or boulders present		
	spread footings normally suitable		**HENRY, chap 4 [(16)]
	settlements usually small		
	deep foundations or piles: for high loads, investigation for presence of boulders, boulders cause piling difficulties		
17 **Clays**—NORMAL	investigation and careful laboratory work essential		*ICE CP 4 (1954), p 34–36 [(16)]. *Good general reference*
	long-term settlements likely:		***HENRY, p 114–120 [(16)]
	calculate settlements for gross pressures exceeding 120 per cent of normal overburden pressure (by specialist)		*Seasonal and climatic variations may cause shrinking and swelling of clays. Foundations should be protected from these effects by adequate cover (soil or structure) or by drainage. See* ICE CP 4 (1954), p 42–43 [(16)]
	strengths vary considerably		
	spread footings frequently possible		**HENRY, chap 4 [(16)]
	driven piles may give trouble		
	bored piles give reliable foundation		**HENRY, chap 8 [(16)]
	for very high loads (multi-storey buildings exceeding five storeys) consider large diameter piles—see specialist		
OVER-CONSOLIDATED			*ICE CP 4 (1954), p 34–36 [(16)]. *Good general reference*
	long-term settlements likely		***HENRY, p 114–120 [(16)]
	normal in London and Thames valley		

	usually of good strength: upper few feet may be softened, strength increases steadily with depth, bored piles very suitable foundation spread footings can be used: beware founding just above clay layer, protect clay from exposure, relief of normal overburden pressure can cause drop in strength, long-term failures in slopes and retaining walls have been known to be caused by above	**HENRY, chap 4 [(16)]
18 **Soft rocks**	chalks, shales, sandstones usually quite good but: softened top must be removed, exposed rock must be protected immediately, check thickness of strata, badly fissured rock may cause differential settlement, check bedding planes of shales	**ICE CP 4 (1954), p 29–31 [(16)] *If any doubt obtain specialist advice*
19 **Peat and marsh land**	very poor foundation material thin peat beds cause settlements of several inches only sure foundation penetrates to better strata for very light structures consider: preloading site to force settlements before building use of sand or paperwick drains excavate and replace with well consolidated fill obtain specialist advice	*ICE CP 4 (1954), p 36–37 [(16)] **BS CP 2003:1959 Earthworks, p 41 [C] **TERZAGHI and PECK, p 398 [Ca]
20 **Fill** (made ground)	investigation essential, very variable constituents and compaction, field loading tests may be of some value, major foundations to be carried to better strata, raft footings may be suitable for very light structures	*ICE CP 4 (1954), p 37 [(16)] *HENRY, p 25–26 [(16)]
SPECIALIST SERVICES REQUIRED		
21 **Specialist design problems**		*ICE CP 4 (1954), p 43 (mining subsidence) [(16)]
SUBSIDENCE	vertical movements due to consolidation of ground under load, or due to change in ground water level or to repacking of soil grains	***WASILKOWSKI, F. Complete protection of structures against damage due to mining subsidence 1951. Cement and Concrete Association translation No 55:1955 [(16)] complete *GIBSON [(16)] complete *ICE CP 4 (1954), p 37–38 [(16)] (foundations on non-level sites)
VIBRATION CONTROL	construction operations: *demolition* *heavy traffic* *piling* environmental sources: *railways (surface and underground)* *roads* *aircraft* *factory processes* internal sources: *machine processes* *services*	Noise Abatement Act 1960 [Aa5] states "Best practical means to be used to prevent noise or vibration" ***CROCKETT, J. H. A. Vibration control in piling and blasting [(17)] *PARKIN, P. H. and H. R. HUMPHREYS Acoustics, noise and buildings. London 1958. Faber and Faber [Ab9] *BUILDING RESEARCH STATION. Digest 78, 1955, Vibrations in buildings [Ab9] **CROCKETT, J. H. A. Vibration control in machine foundations [(33)]
SPECIFIC PROBLEMS	sloping sites (exceeding 1 in 6) dams, marine works (*jetties, piers, sea walls*), river works (*bridge piers, wharfs*)	
22 **Specialist consultant**	if none known, see an organisation of consulting engineers check that nominated consultant: has experience similar work, can undertake work in time available indicate work required: report only, supervision investigation, supervision specialist contractors, undertake complete foundation design, undertake complete field control make available all data from paras 1–12 above	ASSOCIATION OF CONSULTING ENGINEERS, Abbey House, Victoria Street, London sw1 INSTITUTION OF CIVIL ENGINEERS, with the British Society of the International Society of Soil Mechanics and Foundation Engineers, Great George Street, London sw1
23 **Site investigation**	employ reputable firm, inspect laboratory and equipment, if doubtful obtain references	**SfB (11) Ground: General** EDG para 8-23

	explain problem thoroughly before getting estimate, obtain competitive tenders and compare carefully: *check number of samples included, check number of tests included*	**BS CP 2001:1957 [Ca]
24 **Specialist contractor**	obtain references PILING: obtain alternative schemes and quotations, obtain guarantee, check advisability independently	*ICE CP 4 (1954), p 46–68 [(16)]
	GROUND WATER LOWERING: have consultant assess advisability, obtain alternative schemes and estimates: *compare estimates carefully to ensure equality, make period of contract very clear, check no likelihood of damage to adjacent structures*	***ICE CP 4 (1954), p 131–139 [(16)]
	CHEMICAL CONSOLIDATION AND GROUTING: have consultant assess advisability, obtain quotations, compare with alternative methods of construction	***ICE CP 4 (1954), p 141–144 [(16)]

Detail design

STRUCTURAL	*majority of details will be settled by specialist, but architect should consider following:*	
25 **Settlements**	Obtain probable order of settlements from specialist Review complete problem assuming: damage to panels likely if differential movement exceeds ¾ in in 20 ft (1 in 300), damage to framework likely if differential movement exceeds 1½ in in 20 ft (1 in 150) Assess relative difficulties in: providing special foundations to reduce limits to those required, *or* providing structure of type to accept limits of settlement with normal foundations	*ICE CP 4 (1954), p 21–23, 25–27 [(16)] ***HENRY, p 114–120 [(16)] *HENRY, p 155–160 [(16)] *SKEMPTON and MACDONALD [(16)] complete paper
26 **Future works**	Are loads adequate for foreseeable future use and extension? Will any foundations be called upon to accept additional columns, walls, retaining walls in future? Will any foundation be undermined by future landscaping or construction? Will any foundation have to be cut for future works, doors, service runs, staircases?	
27 **Concrete**	prepare design considering: CODES OF PRACTICE	*BS CP 114:1957. The structural use of reinforced concrete in buildings [(2)Eq4] *ICE CP 4 (1954) [(16)]
	BY-LAWS	LONDON COUNTY COUNCIL, London Building (Constructional) By-laws 1952. Clauses 3.02, 3.03, 3.05–3.07 [Aa6] MINISTRY OF HOUSING AND LOCAL GOVERNMENT. Model by-laws, Series IV Building (1953 edition) Part III, by-laws, 18, 19 and 20 [Aa6]
	SPECIFIC SOIL CONDITIONS: sulphates in soil sulphates in ground water	*ICE CP 4 (1954), p 167–169 [(16)] *BRS Digest 31:1951, Concrete in sulphate-bearing clays and ground water [Eq4]
	trade effluents, soft water, acid water	
28 **Reinforcement**	prepare reinforcement details considering: CODES OF PRACTICE	*BS CP 114:1957 [(2)Eq4] *ICE CP 4 (1954) [(16)]
	BY-LAWS	LCC By-laws, Clauses 3.08, 7.03, 7.04 [Aa6] MOHLG Model By-law 20 [Aa6]
	CORROSION—PROVIDE EXTRA COVER	*BS CP 114:1957, p 42–43 [(2)Eq4] LCC By-laws, Clause 7.02 [Aa6]
	PRESTRESSING STEELS	**BS CP 115:1959, The structural use of prestressed concrete in buildings [(2)Gf2]
29 **Structural steel**	prepare design considering:	*Structural steel in foundations is very rarely economical. Reinforced or mass concrete is the most common and economical material*

	CODES OF PRACTICE	*BS CP 113:1948, The structural use of steel in buildings [(2)Hd2]
	BY-LAWS	LCC By-laws, Part VI [Aa6] MOHLG Model By-laws 21 and 22 [Aa6]
		*ICE CP 4 (1954), p 164–167 [(16)]
	CORROSION: concrete cover not less than 4 in, cathodic protection if exposed	**ICE CP 4 (1954), p 171 [(16)] *Cathodic protection* *Sacrificial anode system: artificially created electrical cell inhibiting normal corrosion of buried or water-immersed steelwork (cathode) by use of expendable and replaceable anode* *Impressed current system: as above, but cell created by forming continuous circuit using a permanent anode and supplying an externally impressed current from a power supply. Higher installation cost, but sometimes lower maintenance costs*
	paint (maintenance may not be practicable)	
30 **Brickwork**	prepare design considering:	
	CODES OF PRACTICE	*BS CP 111:1948, Structural recommendations for loadbearing walls [(21)]
	BY-LAWS	MOHLG Model by-laws 21, 26–29 [Aa6] LCC By-laws, Part V [Aa6]
	DETERIORATION BELOW GROUND	*BRS Digest 123:1959, Sulphate attack on brickwork [Fg2]
31 **Connections to footings**	LOADS: end fixity any tension loading bending moments	*Co-ordinate with superstructure design* **SfB (2) Structure: General** EDG
	DETAIL OF CONNECTION: preformed pockets or bolt cones cast-in bolts, starter bars, structural steel inserts provisions for levelling	
	DIVORCEMENT: anti-vibration mountings (*spring, rubber pads*) thermal insulation corrosion insulation waterproofing	**CROCKETT, Vibration control in machine foundations [(33)] *ICE CP 4 (1954), p 165 [(16)]
PARTICULAR FOUNDATION TYPES		
32 **Individual footings**	in relation to:	**HENRY, chap 4 [(16)] AJ Information Sheet No 1022, Foundations for light structures 2: Strip and pad footings [(**18**)]
	services	*Check with service specialists for any inserts required*
	future works landscaping and gardens excavation	*Usually used for lighter stanchion loads, if depth to bearing stratum is so great as to prevent effective mass excavation operations or if there are great variations in levels on site*
33 **Continuous footings and rafts**	in relation to:	**HENRY, chap 5 [(16)] AJ Information Sheet No 1022, Foundations for light structures 2: Strip and pad footings [(**18**)] and No 1023, Raft footings [(**18**)]
	services future works excavation	*Mass excavation is frequently more economical than hand excavation, and may make continuous footing or rafts more economical than large individual footings*
	ground levels	

34 **Buoyant basements**		**PIKE, C. W. and B. F. SAURIN, Buoyant foundations in soft clay for, oil refinery structures at Grangemouth *Journal of the Institution of Civil Engineers*, 1952, 1, part 3, 301-334 [(16)]
	used to reduce effective net pressure on poor soils	*Buoyant foundations must be watertight. Particular attention should be given to service entry points*
	basement space may be utilised: *beware of overloading* *check position of cross walls*	
	check if excavation presents great difficulties: *position of ground water table* *ground water lowering* *temporary cofferdams, disposal of surplus material*	**ICE CP 4 (1954), p 131–137 [(16)]
	provision of sumps (lift pits)	
35 **Piles**	selection of system, test piles, guarantee, tolerances (*line, level*), relation to services	AJ Information Sheets: No 1024 Foundations for light structures 4: Short bored piles [(**17**)] No 1025 Foundations: Piles 1 [(**17**)] No 1026 2 [(**17**)] No 1027 3 [(**17**)]
36 **Building requirements**		
FINISHES	Any work exposed in final structure Any work exposed future developments	
LEVELS	Are levels checked with schedule of floor finishes? Are levels compatible with: service roads and footpaths? landscaping requirements? drains and services?	
WATERPROOFING	Have all waterproofing requirements been met : around steel column bases and holding-down bolts? are rebates for tanking correct? are these shown on specialist's drawing? Has specialist access to all openings required? do required holes or rebates interfere with structural behaviour? agree between architects and specialists responsibility for showing all rebates	**8fB (13) Retaining: Structures**
37 **Programme**	Agree latest dates for: architect's details to specialist, specialist's details to quantity surveyor, specialist's details for tender documents, by-law approval: *obtain requirements local authority, check dates of sitting of relevant approval committee, date of submission to obtain approval before starting*, specialist's details to contractor	

Specifications

38 **Preliminary**	EXISTING SITE: buildings to be demolished, buildings to be protected, roads, footpaths, position and details existing services, diversions required and services to be maintained during construction WAYLEAVES REQUIRED: fencing; watching; water provision ACCESS ROADS: permanent and temporary; rights of way SPECIAL STATUTORY REGULATIONS: working hours, rates of pay, noise, vibration, security ALTERNATIVE FORMS OF CONSTRUCTION	
39 **Earthworks**		*ICE CP 4 (1954) p 124-127 [(16)] **BS CP 2003:1959 [C] Good specialised reference p 67-96
	EXCAVATION TIMBERING METHOD OF MEASUREMENT PUMPING LINES AND LEVELS SETTING OUT PROTECT BOTTOM FROM EXPOSURE: leave last six inches, place blinding concrete immediately final level is reached FILLING: material to be used, method of compaction, temporary support for incomplete walls, excess fill for final settlement, levels, protection against weather during construction	

40 **Piling**		**ICE CP 4 (1954) p 46-83 [(16)] *HENRY, chap 8 [(16)]
	System to be used: possible alternatives, test piles, guarantee Depth: bearing strata Reinforcement: connections to footings Replacements for damaged or wrongly placed piles: tolerances: *level*, *line*	
41 **Materials** (foundation considerations only)		*ICE CP 4 (1954) p 162-163 [(16)]
TIMBER	quality, soundness, lengths, splicing protective measures: impregnation, creosote, chemical—non leaching end grains, capping	BRITISH STANDARDS INSTITUTION BS 913:1954. Pressure creosoting of timber [Du3]
STEEL		*ICE CP 4 (1954) p 164-167 [(16)]
	quality protective measures for exposed steel below ground: use of copper alloy tar coating, bitumen coating, paint coating galvanising, sheradising metal spraying (*zinc*, *aluminium*) cathodic (*expendable anode*, *impressed current*) cleaning, maintenance requirements handling, stacking test certificate, test samples	*ICE CP 4 (1954) p 171 [(16)]
CONCRETE	(general items as main specification for all structural work, but additional items as follows) type of cement: normal portland, sulphate-resisting portland super sulphated portland, high alumina mixes required placing against earth placing under water age before loading: backfilling on top backfilling behind walls inspection before backfilling cover to reinforcement construction joints: water-tightness (*water bars*, *staged construction to minimise shrinkage cracks*)	*ICE CP 4 (1954) p 167-169 [(16)] BRS Digest 31 [Eq4]

Contract stage

42 **Programme**	Agree programme with contractor Check: maturing of concrete, phasing of subsequent works, phasing of services, supplies of subcontract items, supplies of prime cost items	
43 **Temporary works**	Approval by: specialist consultant, local authority	
44 **Permanent works**	setting out, local authority checking general supervision (resident engineer, clerk of works) variations (authorisation, measurements, dayworks) measurements (quantity surveyor)	
45 **Maintenance**	prepare schedule for occupier: type of maintenance, frequency of maintenance names of specialist contractors and equipment suppliers	

Remedial measures

46 **Causes of damage**		
SETTLEMENT	consolidation	*ICE CP 4 (1954) p 22 [(16)]
	ground water movement	
	mineral workings	**HENRY, p 392 chap 9 [(16)]
	slip failures (slopes)	*ICE CP 4 (1954) p 37-38 [(16)] *BS CP 2003:1959 p 33, 34 [C]
	earth movements: rock slides, earthquakes	

WEATHERING	shrinkable clays (may be due to adjacent trees) frost heave erosion floods	*ICE CP 4 (1954) p 42-43 [(16)]
STRUCTURAL	corrosion faulty design overloading undermining (adjacent works) faulty piles (broken in driving) 'necking' of in-situ piles	
47 **Remedies**	always employ specialist consultant	
UNDERPINNING		*ICE CP 4 (1954) p 118-124 [(16)]
bored piles		*ICE CP 4 (1954) p 61-63 [(16)]
chemical consolidation		*ICE CP 4 (1954) p 143-144 [(16)] *Chemical consolidation: consolidation of loose granular subsoils with a single or double fluid injection process forming a permanent gell in the voids of the mass, improving shear strength and decreasing permeability*
new footing on better strata		
REDUCE LOADING		
PROTECT FROM EROSION AND WEATHER		
sheet piling		
curtain walling around edge		
diversionary drains		
paving (must be permanent in construction)		

FOUNDATIONS FOR LIGHT STRUCTURES 1: SELECTION OF TYPES

6.B3

STRUCTURE		SUBSOIL CONDITIONS						
		Rock	Sand		Soft Silt and Clay	Firm Clay	Peat and Marsh†	Fill†
Type of Structure	Loading Intensity		Loose	Compact				
		3-20 ton/sq ft allowable bearing pressures	1-2 ton/sq ft above gwl* ½-1 ton/sq ft at or below gwl	2-4 ton/sq ft above gwl 1-2 ton/sq ft at or below gwl	500-1500 lb/sq ft	1-3 ton/sq ft	250-500 lb/sq ft if dry. Nil if wet	250-500 lb/sq ft but examine carefully
Domestic 2-storey dwellings, on load-bearing brickwork	Approximately 1 ton/ft run on external walls, 1½ ton/ft run on internal walls	Mass concrete strip footing, minimum width, on sound rock. If rock is soft, ie shale, soft chalk, etc, depth to ensure frost protection	(*a*) *Above gwl*—concrete strip footing. Min depth 3 ft 0 in Min width 1 ft 6 in Base should be compacted before concreting. (*b*) *Below gwl*—concrete strip footing. Sump should be dug to lower gwl temporarily. Min width 2 ft 6 in	Mass concrete strip footings	(*a*) Raft footing. (*b*) Short bored piles and spreader beams; ground bearing floor slab between	(*a*) Mass or reinforced concrete strip footings. (*b*) Short-bored piles and spreader beams; ground bearing floor slab between	(*a*) Raft footings. (*b*) Short- or medium-bored piles and spreader beams. (*c*) Driven piles if more than 100 total number required. [Obtain alternative quotations for (*b*) and (*c*)]	(*a*) Raft footings. (*b*) Reinforced beams on pad footings. (*c*) If fill is good and reliable, reinforced concrete strip footings may be suitable
3-5 storey brick buildings, flats, maisonettes, etc. Cross wall construction	Approx 4-6 ton/ft run on internal cross walls	Mass concrete strip footings. Soft rock as above	Reinforced concrete strip footings; if sand very loose or wet, raft footing should be used	Reinforced or mass concrete strip footings	Bored piles and spreader beams, ground bearing floor slab between. If single rows of piles used longitudinal stiffness should be provided, usually by staircase or lift shaft	(*a*) Mass or reinforced concrete strip footings. (*b*) Short-bored piles, ground bearing floor slab between	Foundations must be below peat. Only pile foundations suitable	(*a*) Pile foundations. (*b*) If fill is very good and reliable, raft or strip footings may be used
Single-storey steel or concrete framed buildings up to 60ft 0in span. Brick panel walls, light roof cladding	6-10 ton on columns: approx ½ ton/ft run on panels, walls. Panels may be carried to footings by ground beams	Mass concrete pad footings as required for holding-down bolts; mass concrete strips below walls	Reinforced concrete pad footings, possibly with reinforced beams between if sand very loose or wet. If wet, gwl should be lowered before concreting foundations	Reinforced pad footings, reinforced or mass concrete strip footings to walls	(*a*) Raft footings. (*b*) Short-bored piles. (If clay is very soft, light raft may give trouble due to differential settlements)	(*a*) Reinforced concrete pad and strip footings. (*b*) Raft footings	(*a*) Raft footings may be suitable: pre-loading of site should be considered. (*b*) Piles to firmer strata. Ground bearing floor slab-independent of column and wall footings. Costs of bored and driven piles should be compared	(*a*) Pile foundations. (*b*) If fill very good and reliable, rafts or pad footings may be used
2-3 storey steel or concrete framed structures, light industrial buildings, schools, offices etc	Column loads from 25-40 ton. Panels carried to columns by framework or ground beam	Reinforced or mass concrete pad footings as required for holding down bolts etc	Reinforced concrete pad footings. If sand very loose driven piles should be considered	Reinforced concrete pad footings	Pile foundations to firmer strata	(*a*) Reinforced concrete pad footings. (*b*) For softer clays, piles should be considered, otherwise appreciable consolidation settlements may give differential movements	(*a*) Piles only to firmer strata	(*a*) Pile foundations. (*b*) If fill very good and reliable, pad footings may be suitable

* ground water level
† see *Very poor subsoils*

FOUNDATIONS FOR LIGHT STRUCTURES 1: SELECTION OF TYPES

This Sheet is the first of four on foundations for light domestic, commercial and industrial buildings. This group of buildings constitutes a very large proportion of the total amount of building work carried out in this country and it is felt that the subject of selection of suitable foundations for these structures has not been satisfactorily covered to date in publications or school courses.

The selection of foundations is frequently a matter of economics and where the foundations constitute a major proportion of the total cost, the preparation of alternative schemes and cost comparisons should be considered. The overall design problem of the type of structure may also be worthy of review, since some structures are very much lighter and more flexible than others.

The table on the face of the Sheet gives a guide to selecting the foundations for four basic types of structure and the drawings and notes on the other three Sheets in the series should give sufficient information for the preparation of working drawings.

Selection Table

Each of the four types of structure set out in the table on the face of the Sheet presents a slightly different problem to the designer and each has been considered in relation to seven basic types of subsoil. The recommendation given for each structure/subsoil combination is the most suitable foundation of four basic types, strip, pad or raft footings or short-bored piles. Where alternative types are recommended, the shape and size of the structure should be taken into account when selecting, and cost estimates obtained for each type.

Site Investigations

For most lightly-loaded structures the judicious assessment of information obtainable from local authorities, adjacent property owners, local builders, etc, should make extensive site investigation work unnecessary.

Before ordering an investigation, as much information as is available should be discussed with the soils engineer: an appreciation by him of the problems involved can often reduce the amount of site investigation work to be undertaken and result in the preparation of a useful report. The nature and extent of the structural loads should be particularly emphasised.

Very Poor Subsoils

Where very poor subsoils are known, or likely, to exist, specialist advice should always be obtained. The most difficult subsoils dealt with in these Sheets are peat, fill and very loose water-logged sand: in all these materials very large and unpredictable settlements are likely to occur.

Peat: The consolidation characteristics of peat are still not well known, nor do laboratory tests always supply sufficient data to enable an estimate of probable settlements to be made. Peat is likely to produce a fairly rapid primary settlement of a few to several inches (within weeks or months of construction), and a slower long-term secondary settlement. It may be possible, if the peat layer is not too thick and the drainage conditions are good, to pre-load the site for a period of several months and force the primary consolidation phase of settlement. It is also possible to accelerate settlement by the use of vertical sand drains, but this technique is usually adopted only for major structures. Both these techniques are likely to be very expensive and would only be used in unusual circumstances where the structure could not be economically piled or moved.

Fill: Artificial fills are very variable. They can range from local authority refuse tips to well-compacted, evenly laid, gravel-filled areas and embankments, which may be better foundations than the underlying in-situ material. A careful investigation should always be made of the history of filled sites, all available sources of information being used. The major items for consideration are the material used, the age of the filled area and the method of compaction adopted, if any.

There are many variations of each of these parameters, and many combinations of these variants. It is not possible to generalise about foundations on fill, and specialist advice should always be obtained before building work is planned.

Loose sand: In some estuarine and lacustrine regions very loose recently-deposited sands are found. These have a loose grain structure which is likely to collapse when subjected to vibration or excavation, producing very difficult foundation conditions. This type of subsoil should be avoided: it is unlikely that there will be adjacent structures in the area. The ground water level is critical: if it occurs several feet below the proposed foundation level, it may be possible to compact the sand in situ, using Vibroflotation or some similar technique. The detection of this type of material requires carefully-conducted specialist site investigation. Assessing the amount of compaction required normally needs field tests, and would only be justified for major projects which cannot be resited.

Overall Considerations

When considering structures to be founded on poor subsoils, very careful attention should be given to the overall economics of the project. It may be more economical to design a structure capable of accepting a certain amount of differential settlement, than to provide very expensive foundations. With lightly-framed structures, the effects of settlement are likely to be more pronounced in the cladding and internal partitions than in the frame itself. Here again, it may be more economical to accept a regular maintenance item for redecorating and minor repairs to finishes, than to provide expensive foundations.

SfB (16)

"The present REVIEW describes in general terms the type of foundation which may be chosen in the light of what is known of the subsoil, and explains some of the principles which determine the choice.

The foundation is probably the most important component of a structure and requires extreme care in its treatment; and many variables are involved in most foundation designs. Some are of purely structural significance whilst others are dictated by economic considerations—very often the two are inseparable.

FOUNDATIONS

To illustrate, it is assumed that the investigation of a particular site has established that the subsoil is poor and unreliable for a considerable depth. In arriving at the best solution the engineer must take into consideration both the permissible degree of settlement of the whole structure and of the relative settlements of parts of it, together with its ability to cope with such settlement without cracking and causing damage to infilling walls.

Here are some of the questions that he has to answer:

Should he modify the stiffness of the structure to allow it more or less flexibility?

Should he suggest alterations in the layouts, column spacing and structural form?

Should the foundations consist of isolated piers, or piles, or some form of raft?

The question of economy has now to be considered. At first sight piling might appear more expensive than separate bases, but when the total cost of excavation, shoring, pumping, disturbance to the remainder of the site and the time involved are taken into account, the reverse may prove to be the case.

Moreover, a modification of one element may affect many others and considerable experience is required, both theoretical and practical, to lead the engineer to the right conclusions without the preparation and pricing of innumerable alternatives . . ."

Reproduced above are the opening paragraphs of Truscon Review No.30 which describes in simple terms the principles involved in foundation design. If you do not already possess a copy of this Review you are invited to write for one to any of the offices given below.

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Contents of SO_3

	Soil	*Groundwater*	*Probable severity of attack and precautions*
I	Dry soil, or temporary buildings		Concrete having the strength requirements defined by Table 1 of C.P.114 will be sufficiently resistant
II	Less than 0·5 per cent.	Less than 100 parts per 100,000	Dense concrete made with sound, well graded aggregates and ordinary Portland cement and having a water/cement ratio (based on water content in aggregates plus added water) not greater than 0·55 per cent. is not likely to be attacked
III		*Sea water*	Whilst concrete as described in II above has generally given sufficient durability, the use of ' Sulfacrete ' as an added precaution is recommended
IV	Over 0·5 per cent. Principally present as calcium sulphate	100–500 parts per 100,000	Concrete of the quality described in II above must be used but with ' Sulfacrete ' in place of ordinary Portland cement
V	0·5–2 per cent. Principally present as sulphates other than calcium sulphate	100–500 parts per 100,000	As IV above
VI	Over 2 per cent. sulphates other than calcium sulphate	Over 500 parts per 100,000	Use Lightning Brand High Alumina Cement in thin sections, and protect thick sections from the aggresive solution by coatings of suitable inert materials such as engineering brickwork, asphalt or bituminous paint, using ' Sulfacrete ' inside the protection as an additional precaution

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Piles, footings, other substructures, under-pinning, abutments, protective works

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Holmpress Piles Ltd. offer a wide variety of cast insitu driven and bored piles to suit all site conditions. One of these is the 'Holmpress' patent driven insitu pile described below.

The Equipment

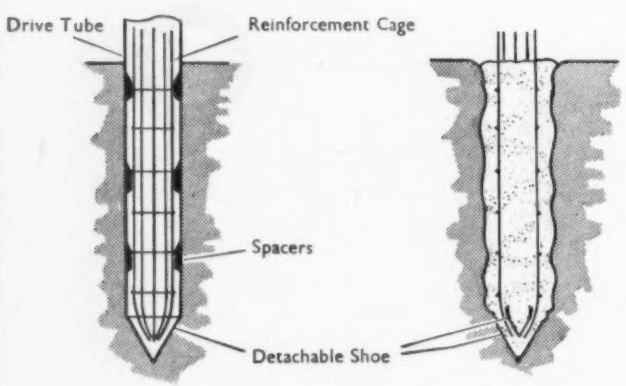
(*a*) A 'Holmpress' piling frame.
(*b*) A sixteen-inch diameter steel drive tube, fitted with a detachable conical shoe, and patented internal vanes.
(*c*) A steel reinforcement cage.
(*d*) A nine-inch diameter steel 're-drive' tube fitted with a detachable conical shoe.

Method of Construction

The drive tube is driven to the required depth, then the reinforcement cage is inserted. The drive tube is filled with a fairly wet mix of concrete and the tube slowly withdrawn; the weight of concrete detaching the shoe from the tube. Immediately after this operation the 're-drive' tube is driven down the centre of the pile thus radially expanding the concrete. The 're-drive' tube is then filled with concrete and slowly withdrawn, leaving its shoe behind. If considered necessary, further 're-drives' may be made.

Advantages

(*a*) Patented vanes in the drive tube ensure a centralised and undistorted reinforcement cage.
(*b*) Patented 're-drive' process radially expands the concrete, ensuring a continuous column of dense concrete in intimate contact with the surrounding ground.
(*c*) The 're-drive' process eliminates peripheral scum, thus ensuring the greatest possible frictional support over the whole length of the pile.
(*d*) The patent 'Holmpress' driven insitu pile has a much higher bearing capacity than ordinary driven or bored piles of the same size.



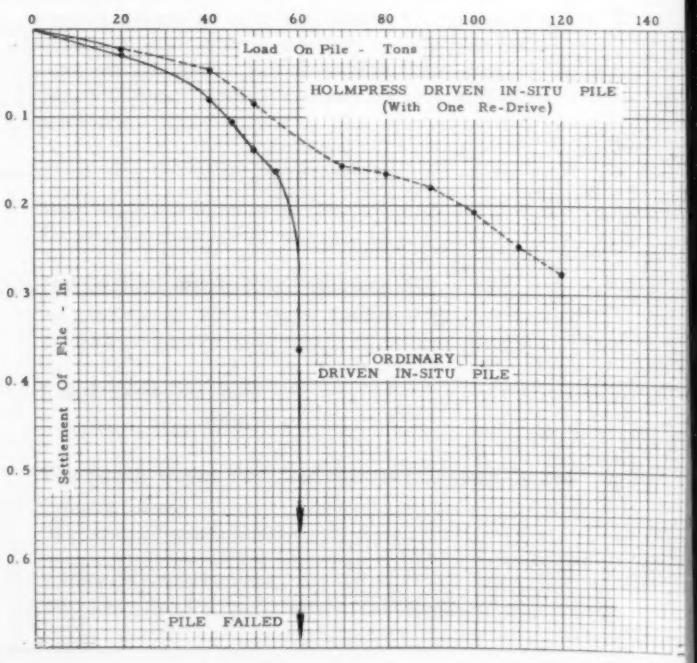
Pile Load Test

A test was carried out measuring settlement against load on a 'Holmpress' drive insitu pile and an ordinary driven insitu pile on the same site and under the same conditions. The results showed that the 'Holmpress' pile continued to withstand the increasing loads long after the ordinary pile had failed.
The readings obtained during the test are tabulated hereunder. The graph illustrates the difference in performance.

Test Conditions

Length of pile: 28ft.
Bearing stratum: Gravel overlaid by clay

	Holmpress Pile (with one re-drive)	*Ordinary Pile*
Load (tons)	Settlement (inches)	Settlement (inches)
20	0·022	0·025
40	0·048	0·080
45	—	0·103
50	0·085	0·138
55	—	0·160
60	—	0·70+
70	0·155	(Pile failed)
80	0·167	
90	0·180	
100	0·208	
110	0·248	
120	0·278	
	(Test concluded)	



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AJ SfB (17)

Information Sheet No 1024 UDC 624·154 Foundations: Piles

FOUNDATIONS FOR LIGHT STRUCTURES 4: SHORT-BORED PILES 6.B6

This Sheet, the last of four on foundations for light structures, deals with short-bored piles, which are intended for use on shrinkable clays.

Principle

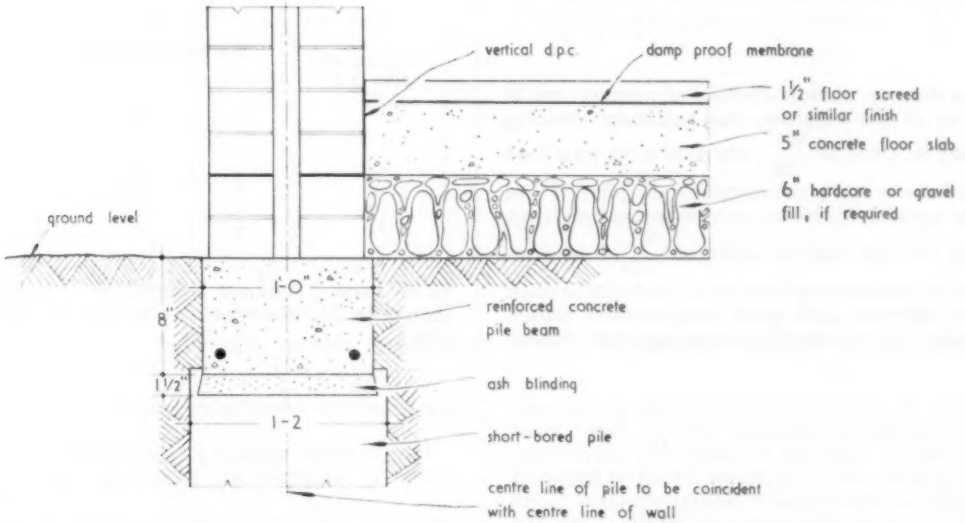
A series of short concrete piles are cast in holes bored in the ground and these are spanned for loadbearing walls, by light beams, normally of reinforced concrete. In framed construction the stanchions are each carried on one pile or, if necessary, on a group of piles. The system has certain advantages over strip foundations: there is less excavated spoil on the site and construction time is faster, especially where holes are bored mechanically, and it is easier for work to proceed in bad weather, when trench digging for strip footings would be impossible. Short-bored piles are not suitable for all clays; they are unsuitable where a great number of stones or tree roots are present: on these sites a strip footing is more easily constructed. Short-bored piles are not recommended in sand or gravel, as they cannot be augered without lining tubes and this makes their use expensive. The drawing below shows a typical short-bored pile.

Site Investigation

The design of the pile is governed by the properties of the subsoil and on large sites, comprehensive tests should be made to discover these properties. Reference should also be made to Civil Engineering Code of Practice No 1 1950 *Site Investigations*. On small sites the following simple check can be carried out on freshly dug clay:

Easily moulded in the fingers	soft
Able to be moulded by strong pressure in the fingers	firm
Unable to be moulded in the fingers	stiff
Brittle or very tough	hard

In addition, local enquiries should be made or tests carried out to find out whether the soil is free from harmful sulphates: the assistance of the local authority should be sought. Where the sulphate content proves to be high, the precautions set out in Building Research Station Digest (First Series) No 31, *Concrete in sulphate-bearing clays and ground waters*, should be observed.
On large sites, load tests are advisable and the procedure set out in the *Chartered Civil Engineer* May 1950 should be followed. On smaller sites it may be more economical to make all piles two feet longer than necessary to ensure safety, rather than to carry out loading tests.



Loadbearing Capacities

The following table gives the loadbearing capacities of piles of differing lengths and diameters.

Strength	Diameter of pile (in)	Loadbearing capacity (ton) for length of pile (ft)			
		6*	8	10	12
Firm at 2ft and stiff at 8ft	10	2	4	5	5
	12	3	5	6	7
	14	4	6	7	8
Stiff at 2ft and hard at 8ft	10	4	6	8	—
	12	5	7	9	—
	14	6	9	11	—

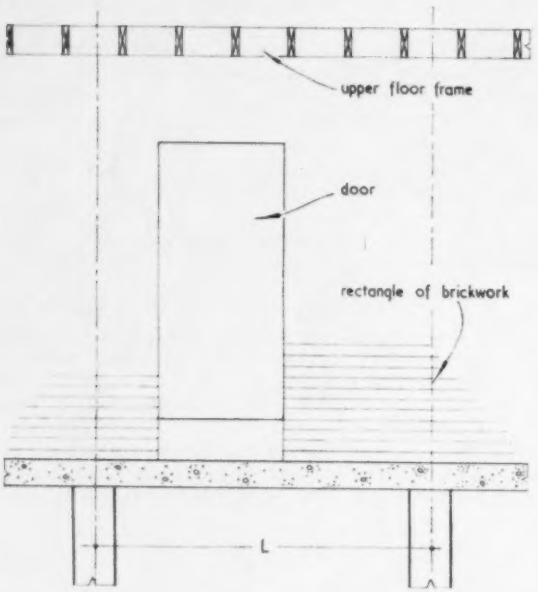
* 6ft 0in piles are advisable for internal situations given adequate shelter by a solid concrete floor or the oversite concrete.

Design of Pile Beams

In normal framed structures, the beams which span between piles are designed as for standard reinforced concrete practice. In most instances where short-bored piles are likely to be used, however, the construction will be loadbearing cavity brick. For this type of construction the design procedure is as follows:
The total load falling onto the beam must be computed. This will include not only the rectangle of brickwork sup-

FOUNDATIONS FOR LIGHT STRUCTURES 4: SHORT-BORED PILES

ported by the beam, but also any floor and roof framing bearing onto this brickwork (see diagram below).



If there is a door or window opening adjacent to one of the piles, as in the diagram, the maximum bending moment may be taken as $\frac{WL}{50}$, where W is the total load as computed above and L the centres of the piles. Where there are no openings or where they occur near midspan the bending moment may be taken as $\frac{WL}{100}$. Reinforcement should be placed at the bottom of the beam to resist the bending moment, and mesh reinforcement should be added at the top over the piles, extending to the quarter points of the beam on either side. The provision of shear reinforcement may be necessary if a door occurs near a pile at the end of a span.

For the normal range of spans and loads the following tables give the size of beam and amount of reinforcement required for each case $\left(\frac{WL}{50} \text{ and } \frac{WL}{100}\right)$

Bending moment $\frac{WL}{50}$

Centres of piles in ft (L)	Depth of beam and size of rods (in) for load in tons (W)			
	4	6	8	10
6	6/$\frac{1}{2}$	6/$\frac{1}{2}$	6/$\frac{5}{8}$	6/$\frac{3}{4}$
8	6/$\frac{1}{2}$	6/$\frac{5}{8}$	6/$\frac{3}{4}$	7/$\frac{1}{2}$
10	6/$\frac{5}{8}$	6/$\frac{3}{4}$	7/$\frac{1}{2}$	7/$\frac{3}{4}$
12	6/$\frac{5}{8}$	7/$\frac{1}{2}$	7/$\frac{3}{4}$	8/$\frac{1}{2}$

In all cases 2 rods are required and the cover to steel should be 2in: the beam width is 12in

Bending moment $\frac{WL}{100}$

Centres of piles in ft (L)	Size of rods (in) for load in tons (W)			
	4	6	8	10
6	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
8	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$
10	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
12	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$

In all cases 2 rods are required and the cover to steel should be 2in: the beam is 12in wide by 6in deep in all cases.

PILE FOUNDATIONS 1: TYPES OF PILE

6.B7

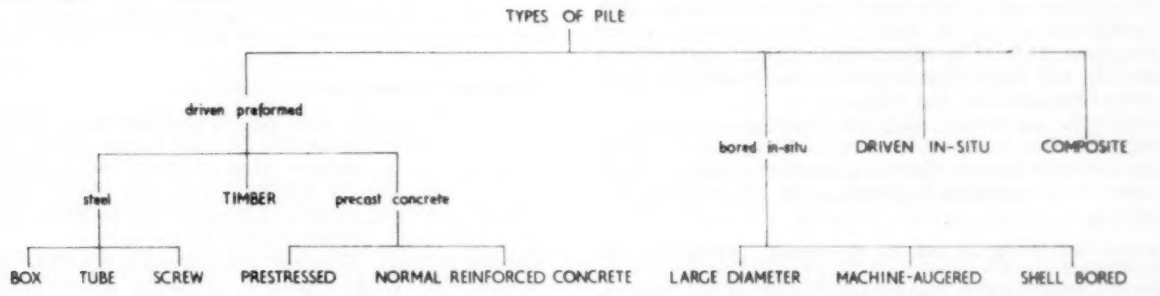
This Sheet, together with Sheet 1026, gives general data on pile foundations and summarises the types of pile which can be used, from conventional driven piles to the wide range of proprietary types now available. The Sheets do not deal with sheet piles but are confined to bearing piles normally used for foundations. A list of manufacturers of proprietary piles, or a note on obtaining non-proprietary piles, is given under each type.

Quotations

All the contractors listed will give advice and quotations for piling schemes for any particular application: where alternative schemes are possible, alternative quotations should be obtained.

When asking for a quotation, the following information should be supplied:

1. Site plan showing:
   (*a*) existing ground features
   (*b*) state of site when piling contractor is to start work
   (*c*) disposition of piles
2. Pile loading diagram or schedule.
3. Comprehensive site-investigation report.
4. Date when:
   (*a*) tender is due
   (*b*) contract is likely to start
   (*c*) completion is required



5. Any available information on adjacent structures and their foundations.
6. Details of any restrictions on noise or vibration.
7. Any head room limitations, eg telephone or power cables, bridges.

When comparing alternative quotations, it is necessary to ensure that each covers the same amount of work. Contracts for bored piles do not normally allow for disposal of excavated material by the piling contractor and therefore where such a scheme is to be compared with driven in-situ or preformed piles, the cost of this disposal must be taken into account.

Except for very small contracts or where time does not permit, all piling contracts should be put out to tender. None of the available proprietary systems has any unique advantage over a similar competitive system.

Preparation of Scheme

The various piling contractors will prepare schemes but it will often be found advantageous to employ an experienced independent consultant to advise on the relative merits of the different types of pile available, and if necessary prepare alternative schemes for which quotations can be obtained. As individual piling contractors always prepare schemes which favour their own method of working, it is often difficult to assess the relative technical and economical merits of these various schemes.

Test Piles

The local authority usually requires at least one pile to be tested on each contract. If a test pile can be constructed at an early stage in the development of the project, it may be possible to effect considerable economies in the number and size of pile used, and on larger projects this is always advisable.

On small contracts, where the ground conditions are well known and the type of pile has been successfully used elsewhere on similar material, it may be possible to dispense with a test pile, perhaps by increasing the design safety factor or by lengthening the piles slightly. It should be remembered, however, that piling is still very largely empirical and for this reason well-conducted pile tests are by far the most reliable method of assessing the carrying capacity of any pile in a particular situation.

Types of Pile

The diagram below illustrates the basic groups into which the types of pile have been divided and the headings to the descriptive notes correspond with the names given in upper case lettering on the diagram.

The descriptions of the various types of pile are necessarily brief: all the specialist contractors referred to will furnish full details of the types of pile they supply. It should be noted that some of the piling types overlap, and it is not always easy to assign some of the proprietary systems available to a particular category: this applies especially to those piles classified as " composite."

Steel Box Piles

Various rolled steel sections are fabricated to form a box section and driven into the ground from a standard pile frame or crane with a double- or single-acting hammer.

Sizes: Steel areas/ft run vary from 14 to 79 sq in with a considerable number of intermediate sizes. The sizes normally used as bearing piles (Frodingham Octagonal and B.S.P. Rendhex) are from 21 to 47 sq in. Sizes at the extreme limits of the range are made by using the lightest/heaviest of the steel sheet piling sections available to make box piles.

Lengths over 150ft have been used. On-site welded connections between units are easy to make.

Loading capacity: Dependent on subsoil, but ranges from 5 to 100 ton per pile; the normal order of load is 30 to 60 ton.

Applications: Marine structures; structures on very poor

PILE FOUNDATIONS 1: TYPES OF PILE

fills and alluvial soils overlying good bearing strata at depths of from 50 to 100 ft. Easily driven from floating craft or light piling frames, with moderately-sized hammer (3 to 4 ton normal). Easily spliced for extension, or cut if too long. Can be driven to rakes of up to 1 in 3. No danger of damage due to handling. Light in weight. Have high bending strength to resist horizontal loads.
Problems: Corrosion; either very effective coating or some form of cathodic protection required. 'Between tides' protection particularly difficult. Manufacturers should be consulted about best methods for any particular situation.

British Steel Piling Co Ltd, 10, Haymarket, London sw1 (Frodingham box piles, Frodingham octagonal piles)
South Durham Steel & Iron Co Ltd, Cargo Fleet Iron Works, Middlesbrough, Yorkshire (Larssen box piles, Rendhex foundation columns)

Steel Tube Piles

Thin-walled steel tubes, either single-seam welded or spirally welded from sheet steel. These may be driven via a mandrel bearing on a special shoe at the toe of the pile, and are filled with concrete after driving.
Sizes: 10 to 30in dia from 10g to ¾in wall thickness. Lengths, normally 30 to 80ft but easily extended by welding.
Loading capacity: 5 to 100 ton; normal capacity about 30 to 50 ton.
Applications: Economical on steel, since the casing can be filled with concrete after driving and does not need to be loadbearing. Thin-walled casings may be driven from the bottom. Casing may be allowed to corrode after installation. Used in small to medium-sized marine structures and bridge piers, through very soft alluvial deposits and fills to firm bearing strata. Bending strength lower than standard box piles.
Problems: Corrosion may be unsightly if casing is exposed. Thin-walled tubes require fairly careful handling to avoid damage. Concrete hearting requires careful supervision, particularly if pile is to be exposed after driving.

British Steel Piling Co Ltd, 10, Haymarket, London sw1 (BSP cased piles)
South Durham Steel & Iron Co Ltd, Steel Pile Dept, Stockton-on-Tees, Co Durham
(Several other manufacturers of thin-walled steel pipe are available, but the above manufacturers both have experience of driving pipe as piles)

Steel Screw Piles

A proprietary system consisting of a large steel two-bladed screw, driven by rotation into soft soil to provide a large bearing area at comparatively shallow depths.
Sizes: Shafts from 1ft 6in to about 4ft 6in dia. Screws from 4ft to about 10ft dia. Steel shafts can be used from 6in dia. Lengths from about 30ft to more than 80ft.
Loading capacity: From 40 ton approx to 300 ton approx but dependent on subsoil conditions.
Applications: Exclusively for dock and jetty work; heavy civil engineering construction only. Used in very soft silts and sands, and mixed alluvial deposits, can provide a satisfactory foundation at a reasonable depth, by giving a good spread of load on the large diameter screw head.
Problems: Heavy specialised equipment necessary; only practicable on large contracts.

Braithwaite Foundations and Construction Ltd, Dorland House, Regent Street, London sw1

Timber Piles

Normal square sawn or as-felled timber, either hard- or softwood, driven by a drop or single-acting mechanical hammer from a piling frame or crane.
Sizes: Sizes available 9in by 9in to 24in by 24in; normal sizes used are 12in by 12in, 14in by 14in and 16in by 16in. Lengths without splices up to 40ft (or more if required, but long lengths not easily obtained).
Loading capacity: 5 to 50 ton. Normal range 15 to 35 ton.
Applications: Small contracts in shallow alluvial deposits (rivers, estuaries, etc) overlying reasonable bearing strata. Very easily handled and driven with minimum of experience. Splicing not easy. Steel shoes normally used.
Problems: Selection of sound timber. Every piece should be individually approved by the architect or engineer. Difficult to assess 'set' accurately. Liable to attack in water, must be treated accordingly. See Civil Engineering Code of Practice 4, p 55 and 162.

Timber for piles can be obtained from most large timber dealers. Practically all building and civil engineering contractors have the plant and experience to drive timber piles

Prestressed Concrete Piles

Prestressed concrete piles, pre- or post-tensioned, precast either in a factory or on the site, and driven with a drop or single-acting hammer from a normal piling frame.
Sizes: From 10in by 10in square to 30in dia or more, hollow and solid sections. Lengths of up to 90 to 100ft have been used, sometimes cast on the site.
Loading capacity: 20 to 150 ton; normally 50 to 100 ton.
Applications: Large contracts, frequently jetties, quays, or piers, bridge foundations, power stations, etc. Soft alluvial deposits to firm bearing strata, with or without shoes. On large contracts, can be handled and driven fairly quickly. Easier to handle than normal reinforced concrete, with lighter sections for equal strength. Quite good bending strength.
Problems: Pre-tensioning requires established works with good transport facilities, or setting up pre-tensioning beds on site. Fairly heavy handling plant and piling equipment needed on site. High quality concrete essential. Splicing and repairs difficult.

Most of the precast concrete manufacturers can manufacture prestressed concrete piles to order, either pre- or post-tensioned. Driving is undertaken by all the major civil engineering contractors

PILE FOUNDATIONS 2: TYPES OF FILE

6.B8

This Sheet, together with Sheet 1025, summarises the types of pile which can be used, from conventional driven piles to the wide range of proprietary types now available. The Sheets do not deal with sheet piles but are confined to bearing piles normally used for foundations. A list of manufacturers of proprietary piles, or a note on obtaining non-proprietary piles, is given under each type.

Normal Reinforced Piles

Precast normally-reinforced concrete piles, cast either in a factory or on the site, and driven with a drop or single-acting hammer from a normal piling frame.
Sizes: From 10in by 10in to 18in by 18in solid sections. Lengths of up to 100ft have been used.
Loading capacity: 20 to 100 ton normal.
Applications: Soft alluvial deposits and fill overlying firmer strata. For practically any type of structure, but not usually economical if less than 100 piles required in total. Medium to large contracts normal, with pile lengths of 25 to 60ft.
Problems: Piles subject to damage during handling or driving if not well made. Heavy handling and driving equipment required. Piles difficult to splice.

Most of the major precast concrete manufacturers and civil engineering contractors have experience in making reinforced concrete piles

Large Diameter Bored Piles

Piles formed by placing concrete in situ in large-diameter unlined or lined holes (greater than 30in), formed by drilling with augers, grabs or other special cutting tools. Bases can be belled out in clays to give an increased bearing area.
Sizes: Diameters from 2ft 6in to 8ft 6in are available, the normal lengths of pile being up to 80ft, although some contractors offer much longer piles in special cases, up to approximately 200ft. Toes can be belled out to about twice the shaft diameter if required.
Loading capacity: Depending on subsoil, from 250 to 1,500 ton. Normal range from 250 to about 800 ton.
Applications: Most economically used in stiff clays, with structures giving fairly high load concentrations, eg multi-storey buildings, bridges, etc, or for transferring loads to a good rock bearing strata. Large cylinders can be used with various forms of precast concrete lining to penetrate water-bearing strata, but these are only used in special circumstances.
The advice of specialist engineers should be obtained for all foundations using large diameter cylinders. Competitive prices for normal bored piles, or driven preformed or in-situ piles, should be obtained if applicable.
Problems: Test loading is very expensive: if local authority insists on tests this may make the scheme uneconomical. Design requires highly specialised knowledge and good extensive site investigations. Equipment usually heavy, requiring fairly level site.

Beneto, 55-57, Avenue Kleber, Paris, France (available under licence in the UK)
Braithwaite Foundations & Construction Ltd, Dorland House, Regent Street, London SW1
Economic Foundations Ltd, 161, Victoria Street, London SW1
Frankipile Ltd, 39, Victoria Street, London SW1
McKinney Foundations Ltd, Manor Way, Borehamwood, Herts
C. S. Sims Ltd, 2, Victoria Street, London SW1
Soil Mechanics Ltd, 65, Old Church Street, London SW3
Whatlings Ltd, 10, Woodside Crescent, Glasgow C3

Machine-augered Piles

Piles formed by placing concrete in situ in small diameter unlined holes made with a high-speed lorry-mounted auger, or with a hand-operated auger.
Sizes: 10 to 35in diameter; up to 25ft long.
Loading capacity: 1 to 40 ton, usually ranging from 5 to 25 ton.
Applications: For penetrating very poor upper strata to firmer foundation, for lighter buildings, houses, schools, offices, etc, or for transferring loads on shrinkable clays to a depth below which the effects of weathering are negligible. In suitable clay subsoil piles can be constructed very quickly and economically. Should be considered for light structures if normal footings need to be more than 4ft 6in deep.
Problems: Piles are usually machine-augered and on a very uneven site this may be impracticable. Hand-augered piles can be used, but are not usually as economical. Unlined auger holes are not practicable in loose fills, gravels or sands, particularly if these are below the water table.

The Cementation Co Ltd, 20, Albert Embankment, London SE1
Frankipile Ltd, 39, Victoria Street, London SW1
Holmpress Piles Ltd, 22, Kingsway, London WC2
McKinney Foundations Ltd, Manor Way, Borehamwood, Herts
Soil Mechanics Ltd, 65, Old Church Street, London SW3

Shell Bored Piles

Piles formed by placing in-situ or precast concrete in holes excavated by auger, clay cutter, grab or similar tool in the medium diameter range. Holes through soft clays or granular soils are usually lined but may be unlined in firm or stronger clays. Concreting can be carried out under compressed air in water-bearing ground if required.
Sizes: 12 to 36in diameter; lengths up to 80ft. Normal range 15 to 24in diameter; lengths, 40 to 60ft.
Loading capacity: From 10 to 150 ton; normal range 30 to 80 ton.
Applications: Clay sites where small and medium numbers of piles (up to about 300) are required. Larger contracts can be economical in special subsoil conditions. Most economical in clay subsoils. Useful when piling must be done with the minimum of vibration and disturbance to adjacent structures, or on closely-piled sites where driven piles tend to pack the subsoil and make subsequent driving very difficult. Some contractors offer special compressed air techniques for piling in water-bearing gravels and sands. Expanded bases can be formed in suitable situations, although these sometimes involve driving the concrete in situ. Precast concrete cores with a grouted annular ring are offered by one contractor.
Problems: Piling through water-logged ground requires very careful supervision and construction. Badly-made piles can give rise to reductions in the strength of the surrounding clays, or to 'necking' of the concrete in sands and gravels. Horizontal ground water movements may damage green concrete as the lining tubes are withdrawn. These ground water movements are likely to occur on sloping sites, near water courses or beaches, and in mining regions.

The Cementation Co Ltd, 20, Albert Embankment, London SE1
Frankipile Ltd, 39, Victoria Street, London SW1
Holmpress Piles Ltd, 22, Kingsway, London WC2
Piling & Construction Co Ltd, 111, St. James's Road, Croydon, Surrey
Pressure Piling Co Ltd, 637, Old Kent Road, London SE15
Soil Mechanics Ltd, 65, Old Church Street, London SW3
Terrasearch Ltd, Ruislip Road, Northolt, Greenford, Middlesex

PILE FOUNDATIONS 2: TYPES OF PILE

Driven In-situ Piles

The piles are formed by driving a steel or concrete tube with an expendable concrete or steel toe, and by packing the tube with in-situ concrete, driven with an internal drop hammer or similar means. The lining tube is usually withdrawn as the in-situ concrete is driven, permitting the in-situ concrete to fill any voids in the surrounding soil, but may be left in if required in water-bearing ground. Some types of pile can have successive redrives with further charges of in-situ concrete if necessary.

Sizes: Nominal diameters from 13½ to 25in; lengths up to 80ft possible. Normal range 15 to 20in diameter; length about 35 to 60ft.

Loading capacity: 20 to 130 ton depending on size and subsoil. Normal range from 30 to 75 ton.

Applications: Medium and large contracts in competition with preformed driven piles. Useful in variable strata, when lengths may vary unpredictably making precast concrete piles uneconomical. A reasonably open level site is required since the piling rigs are usually fairly heavy.

Problems: As with preformed piles, driving causes vibration. In soil likely to have horizontal ground-water movements, special care must be taken to prevent the concrete from being spoilt before setting.

The British Steel Piling Co Ltd, 10, Haymarket, London sw1 (Vibro pile)
F.C. Construction Co Ltd, City Road, Derby (Alpha pile)
Frankipile Ltd, 39, Victoria Street, London sw1
H.D. Foundations Ltd, 157, Millbank, London sw1 (Delta pile)
Holmpress Piles Ltd, 22, Kingsway, London wc2
Simplex Concrete Piles Ltd, 7, Lygon Place, Grosvenor Gardens, London sw1

Composite

Some piling systems have been developed which combine the use of precast concrete and in-situ concrete. These constitute a special class, although the details of manufacture vary considerably between contractors. Their chief advantage lies in providing a pile of readily variable length made of high-quality precast concrete, combined with an in-situ concrete core unstressed by driving; or in providing a hard precast concrete core to an in-situ bored or driven pile, which reduces or eliminates the possibility of 'necking' due to ground-water movements.

Sizes: 14 to 24in diameter; lengths from 10 to 100ft.

Loading capacity: 20 to 120 ton. Normal range 30 to 90 ton.

Applications: On medium and large contracts, and where ground conditions due to running water or very loose material are not suitable for bored or driven in-situ piling. Wests shell piles (Wests Piling and Construction Co Ltd) normally compete with other forms of piling in this field. The other manufacturers mentioned provide special composite piles for situations in which their standard products might not be satisfactory.

Problems: The piling process is rather complicated, and closer supervision than usual may be advisable. Piling equipment is usually heavy, and steeply-sloping or over-water sites may make these systems uneconomical. These systems should always be considered in competition with normal driven preformed piles.

The British Steel Piling Co Ltd, 10, Haymarket, London sw1 (Prestcore pile)
Frankipile Ltd, 39, Victoria Street, London sw1
Holmpress Piles Ltd, 22, Kingsway, London wc2
Wests Piling & Construction Co Ltd, Bath Road, Harmondsworth, West Drayton, Middlesex.

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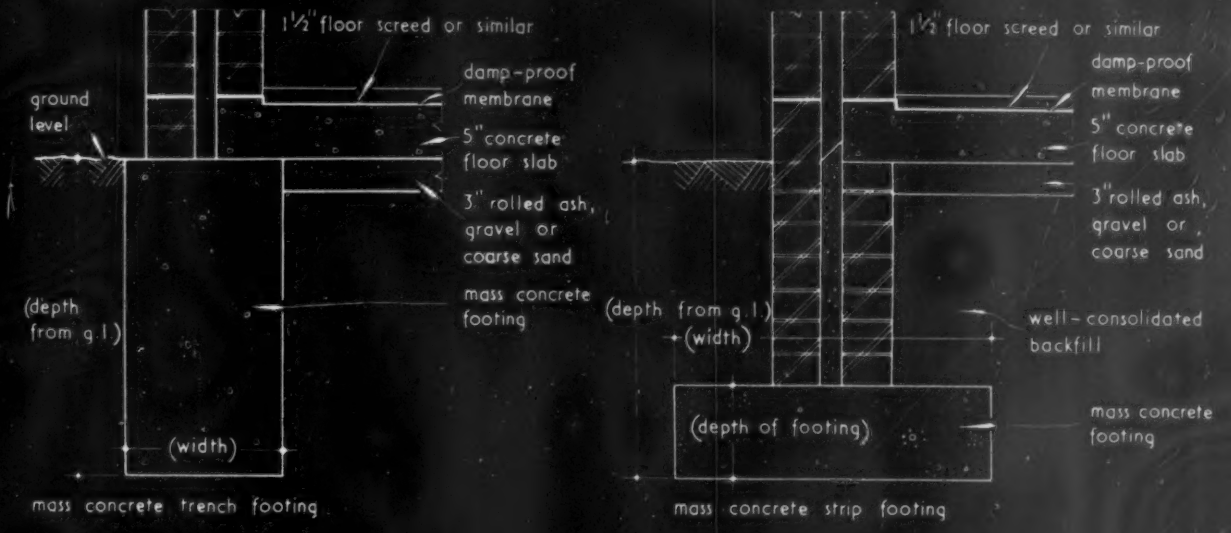
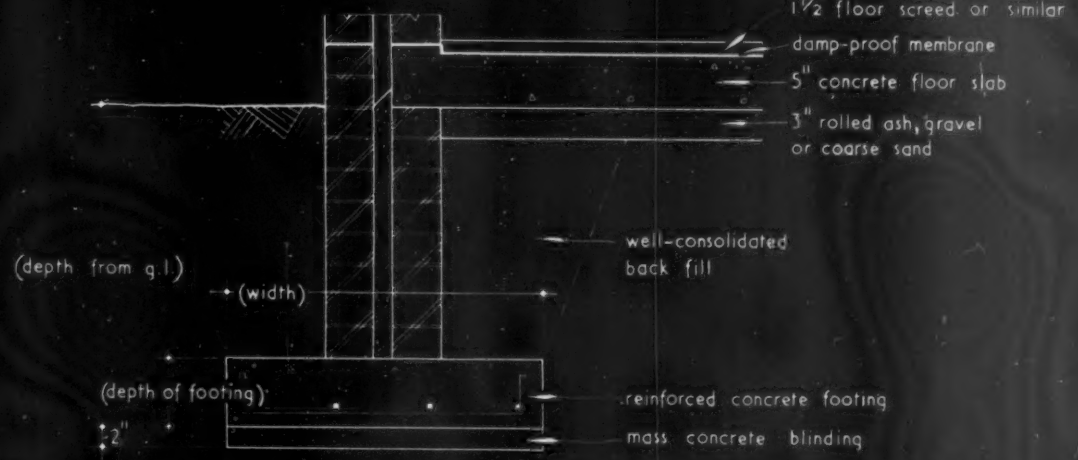
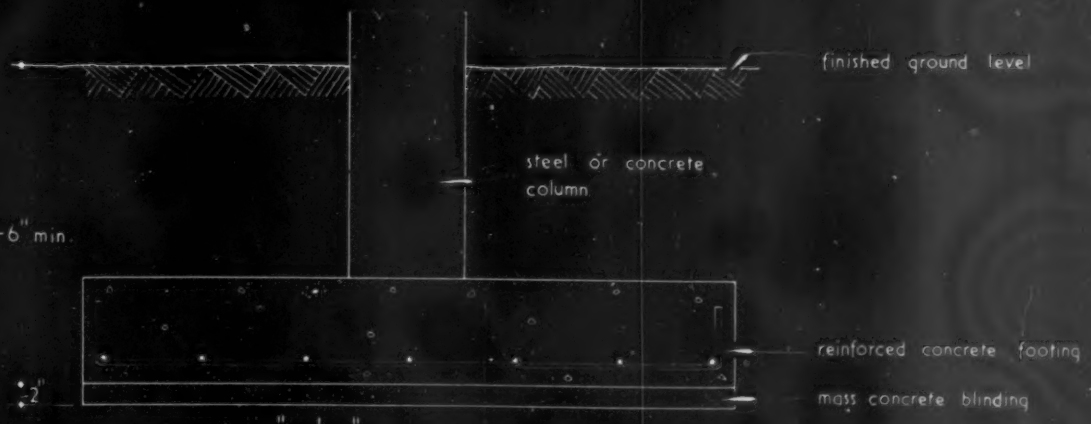
AJ **SfB (18)**

Information Sheet No 1022 **UDC 624-153**
Foundations: Footings





STRIP FOOTINGS scale $\frac{3}{4}" = 1'-0"$



PAD FOOTINGS scale $\frac{3}{4}" = 1'-0"$

FOUNDATIONS 2 : STRIP AND PAD FOOTINGS

FOUNDATIONS FOR LIGHT STRUCTURES 2: STRIP AND PAD FOOTINGS

This Sheet, the second of four on foundations for light structures, deals with strip and pad footings. The drawings on the face give typical examples of each and should be read in conjunction with the following notes.

Strip Footings: Mass Concrete

In the first example, the width of the footing should be:
(*a*) 1ft 3in minimum.

(*b*) $\frac{\text{load/ft run (including foundations)}}{\text{allowable bearing pressure}}$

(*c*) a greater width than the above may be selected by the contractor to suit his equipment.

The depth into soil from the finished ground level should be not less than 2ft 6in and into solid material not less than 1ft 0in. On sound rock it is only necessary to lay sufficient concrete to give a level base for the brickwork.

In the second example, the width of the footing should be $\frac{\text{load/ft run}}{\text{allowable bearing pressure}}$ and the base not less than 2ft 6in below the finished ground level.

The depth of the footing should be 6in minimum or the same as its projection from the brickwork whichever is the greater. The brickwork below ground level should have a crushing strength of not less than 3,000 lb/sq in.

Strip Footings: Reinforced Concrete

The width of the footing should be $\frac{\text{load/ft run}}{\text{allowable bearing pressure}}$ and the base not less than 2ft 6in below the finished ground level. The depth of the footing slab depends on the width and reinforcement which are given in the following table.

The brickwork below ground level should have a crushing strength of not less than 3,000 lb/sq in. The concrete should be 1:2:4 mix, giving a crushing strength of 3,000 lb/sq in at 28 days.

Allowable bearing pressure (ton/sq ft)	depth of slab (in): dia. of transverse bars (in): centres of bars (in) for width of footing (ft in)				
	2 6	3 0	3 6	4 0	4 6
0·5	6½:⅜:12	6½:⅜:6	6½:½:10	6½:½:8	6½:½:6
1·0	6½:½:9	6½:½:6	6½:⅝:7	7½:⅝:7	7½:¾:8
1·5	6½:⅝:9	6½:⅝:6	7½:¾:8	8½:¾:7	9½:¾:7
2·0	6½:⅝:6	7½:¾:8	8½:¾:7	—	—
2·5	7½:⅝:6	8½:¾:7	—	—	—
3·0	7½:⅜:7	—	—	—	—

Note: Longitudinal bars should be ⅜in dia at 12in crs for all transverse reinforcement other than ¾in dia; for the latter ⅜in dia bars at 8in crs should be used.

Pad Footings

$$\frac{\text{column load} + \text{estimated weight of footing}}{\text{allowable bearing pressure}}$$

For details of design, reference should be made to *The Design and Construction of Engineering Foundations*, by F. D. C. Henry, page 169, Section 4.5.

A reinforced concrete ground beam spanning between footings can be used to support the panel walls if required.

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Information Sheet No 1023 UDC 624·153
Foundations: Footings

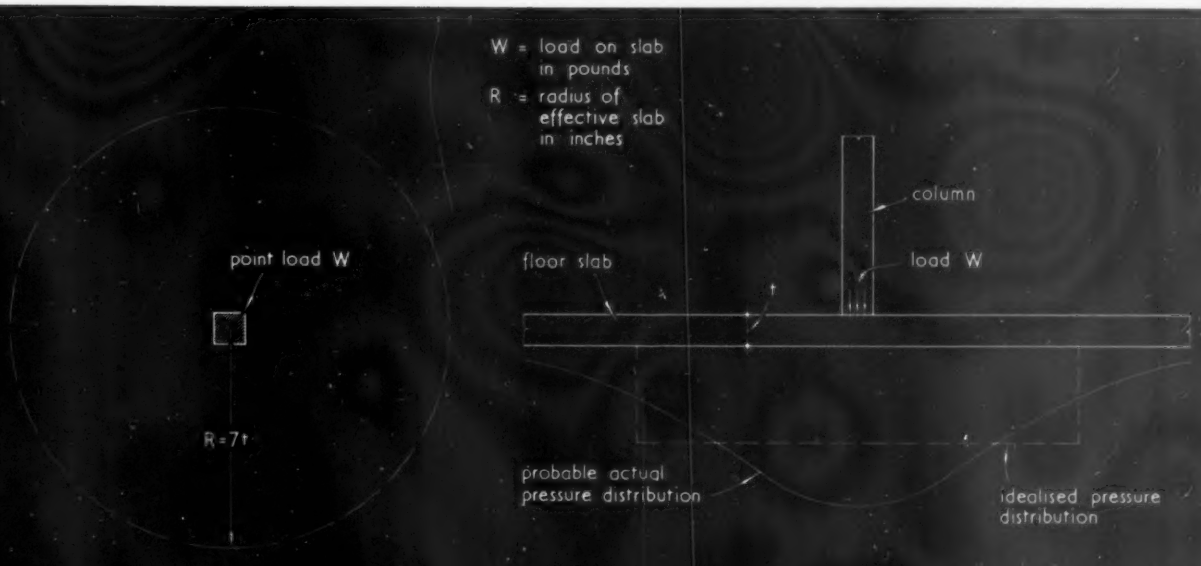
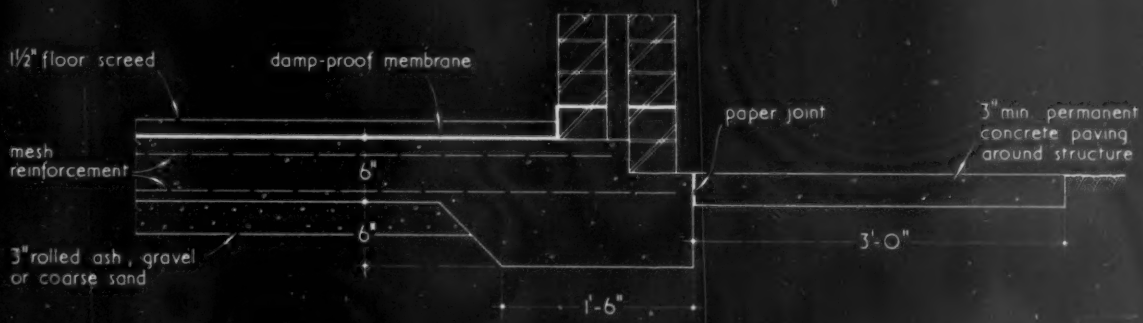
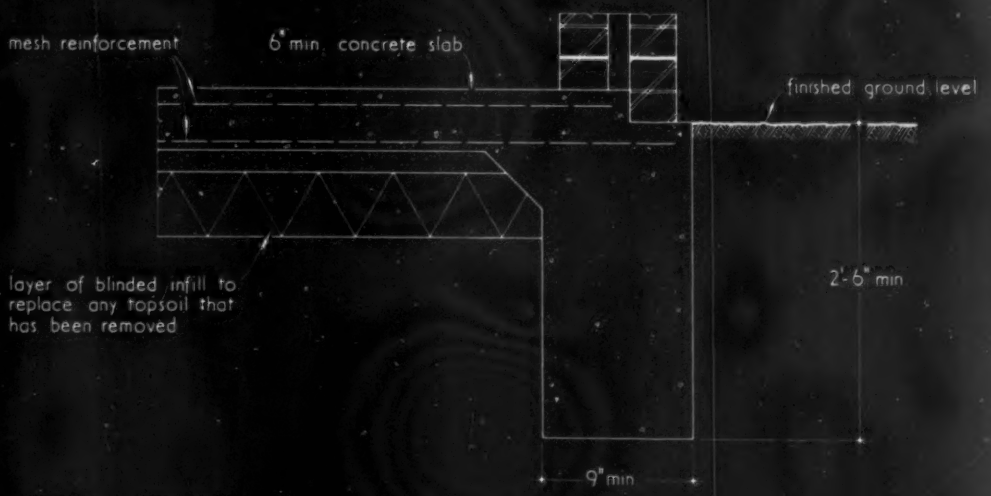


DIAGRAM ILLUSTRATING SPREAD OF POINT LOAD



permanent paving around edge



turned-down edge beam

ALTERNATIVE DETAILS AT EDGE OF RAFT

FOUNDATIONS FOR LIGHT STRUCTURES 3: RAFT FOOTINGS

This Sheet, the third of four on foundations for light structures, deals with raft footings. The drawings on the face illustrate two methods of finishing the edge of the raft and give a diagrammatic indication of the spread of point loads.

Principle

Raft foundations are normally used on poor soils for very lightly-loaded structures and for this application they are usually considered as flexible, ie no attempt is made to design them as rigid units, which would increase the cost considerably. Considered as flexible units, they are capable of limiting differential settlements, but on very poor or variable soils, eg peat, fill, these settlements may still be sufficient to cause damage to stiff wall panels etc. In poor soils, the upper 1ft 6in to 2ft 0in of soil sometimes forms a crust which is stiffer than the underlying material. To build a light raft on top of this crust is preferable to penetrating it with footings. The use of flexible rafts should always be considered with caution and in full knowledge of the whole structural problem: settlement calculations are frequently necessary.

Design

Point loads on the raft spread over a radius approximately 7 times the slab thickness, as illustrated in the diagram on the face of the Sheet: loading intensity should be checked on this basis. For more detailed analysis, including edge and corner conditions, reference should be made to *Stresses in concrete pavements computed by technical analysis* by Westergaard, 1926 *Public Roads* (US publication) 7:25.

The coefficients in the table below enable bending moments to be calculated for several likely combinations of column size and slab thickness.

Having selected a slab thickness the approximate bending moment can be rapidly calculated from the expression $M = K.W$.

where W = total load (dead and live) at foot of column.
K = coefficient from table.
M = bending moment in lb in/ft of slab (in either direction)

The concrete stresses in the slab with this bending moment are then checked, and if need be the assessment of slab thickness is revised and the operation repeated.

Equal reinforcement is provided in two directions at right angles. It is normal to provide two layers of reinforcement over the whole area of the slab supplementing this with additional reinforcement as required in the bottom of the slab beneath columns, walls, etc. It may sometimes be economical to provide local thickening beneath the more heavily loaded columns, rather than to increase the slab thickness throughout.

The design of slab thickness and amount of reinforcement required follows standard practice once the bending moment has been found. The slab should also be checked for both punching and normal shear.

Raft slab thickness (in)	Bending moment coefficient for columns of least lateral dimensions or diameter (in):				
	6	8	10	12	14
5	6·46	5·74	5·20	4·73	4·35
6	6·90	6·20	5·62	5·20	4·80
7	7·30	6·58	6·02	5·55	5·20
8	7·61	6·88	6·35	5·90	5·50
9	7·91	7·20	6·64	6·20	5·80

Coefficients for intermediate sizes can be obtained by linear interpolation.

Note: The coefficients are obtained assuming a spread as in the diagrams on the face of the sheet seven times the slab thickness.

Terzaghi in *Evaluation of Coefficients of sub-grade reaction* (Geotechnique, December 1955) has stated this to be reasonable, but for heavily-loaded rafts a complete analysis should be carried out to determine the actual effective area of the raft. Such an analysis is beyond the scope of this article and should be left to the specialist engineer. The calculation of the bending moment coefficients has been based on a formula from R. J. Roark *Formulas for Stress and Strain* (McGraw Hill, New York, 3rd edition, 1954) p 197, for the stress in a flat circular plate loaded as shown in the diagram on the face of the sheet.

Construction

The details on the face of the Sheet show alternative methods of protecting the edges of the raft from frost and weathering. In the first case there must be no possibility of the paving's being broken out or replaced by lawns or flower beds at a later date. In the second case, the contractor may, for practical reasons, prefer a wider edge beam than that shown but care should be taken in poor ground to avoid having too rigid an edge beam.

A third method of protecting the raft is by means of an effective and maintained field drain, at a depth of 2ft 6in, at the edge of the raft, with well-graded granular fill above and below the edge of the raft.

Before the raft is laid all top soil must be removed and the existing ground, which should be compacted natural soil or good fill, rolled to give an even bed.

SfB (19)

Architecture USA by Ian McCallum

SINCE 1950 AMERICA, a land of opportunity and a land of achievement, has attained a dominant place in world architecture. But it has remained largely unknown territory for want of a book that sets out to map the whole field.

Architecture USA remedies this omission by surveying the field in breadth and depth, studying not only the major architects in America today, but also their antecedents—the great pioneers and the social and historical developments that have carried their ideas to fruition. Here, in close enough juxtaposition to make comparisons possible and influences clear, are H. H. Richardson and Louis Sullivan and Frank Lloyd Wright, the pioneers of the Middle West; Greene and Greene and William Maybeck, pioneers of the West Coast; Raymond Schindler, Richard Neutra, Gropius, Breuer, Mies van der Rohe, the Europeans who have made an heroic contribution to US architecture; Edward Stone, Philip Johnson, Charles Eames, Buckminster Fuller, Paul Rudolph and others who have helped to make modern American Architecture both modern and American.

In **Architecture USA**, Ian McCallum has combined first-hand experience with extensive research to draw a group portrait of the most stimulating assembly of architectural minds in the world today.

Size 11¼×8¾ ins., 216 pages, with 474 halftones and 90 line illustrations and a bibliography. 63s. net, postage 1s. 9d.

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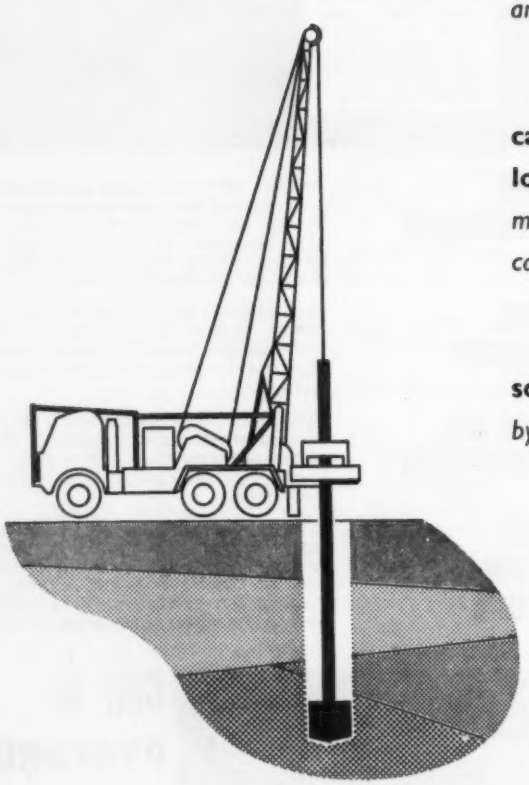

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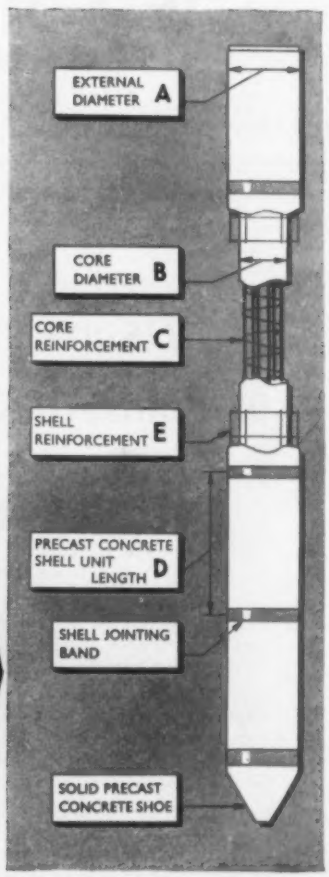

PILE DATA

To be read in conjunction with sectional drawing.

Ext. Dia. "A"	*Core Dia. "B"*	*Core Reinforcement "C"*	*Shell Length "D"*	*Shell Reinforcement "E"*	*Loading (Tons)*
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The Elementary Principles of Reinforced Concrete Design

W. H. ELGAR, M.A., M.ENG.

The author of this book is a civil engineer and a chartered surveyor who, for some years, has been a lecturer at Cambridge University. His purpose in writing this book is to provide an introduction to the subject of reinforced concrete design which will be suitable for students of architecture or building surveying. He has therefore dealt with the subject almost entirely in its relationship to buildings, and frequent reference is made to the Codes of Practice which govern the use of reinforced concrete in this field of design.

In his preface the author writes, ' It is hoped to show that the design of the structural elements of a building is not merely a matter of substituting the right dimensions in the " right formula ", but that it involves judgement and a sense of the right use of materials, which raises it to the status of an art with its own logic and philosophy. For this reason the load factor method of design and the basic principles of prestressing are discussed in general outline.' Fully worked out examples of the design of structures are not included, for they are considered to be beyond the intended scope of the book and likely to prove confusing and discouraging to the student reader. The calculations which have been included are those which it is considered necessary to the explanations of the principles of design.

Size 8¾ × 5½ ins. 112 pages with 56 diagrams. 18s. 6d. net, postage 11d.

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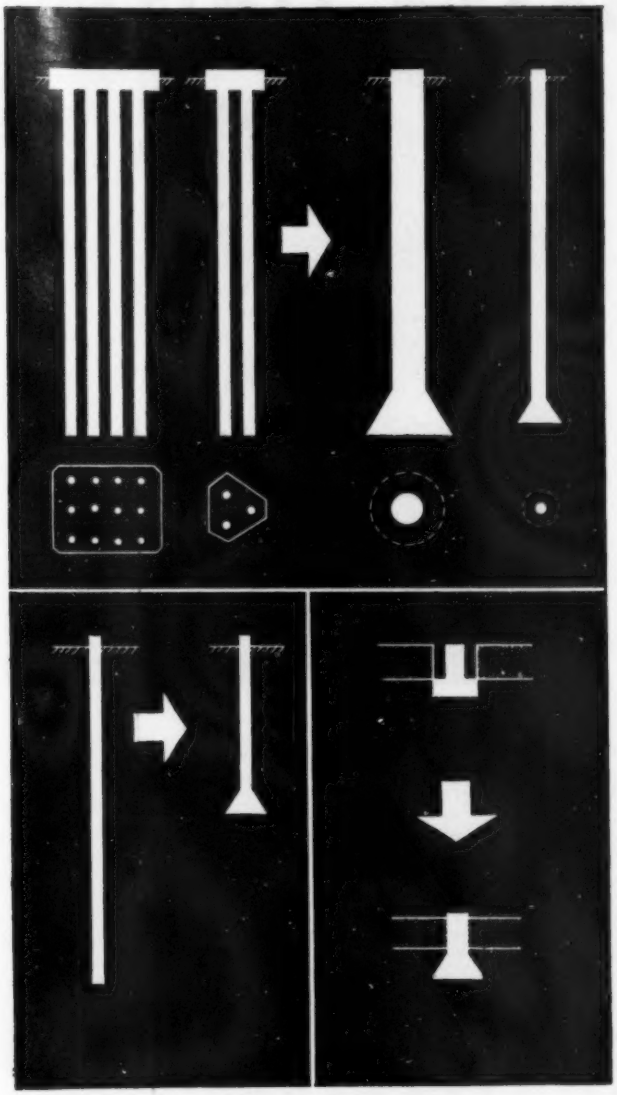

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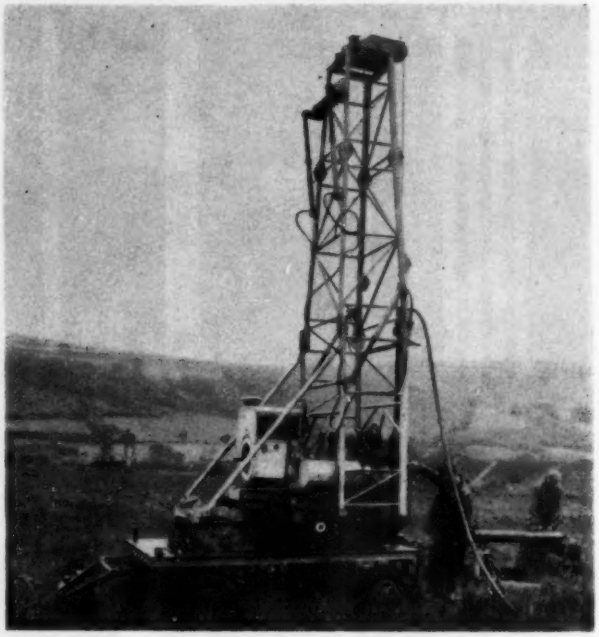

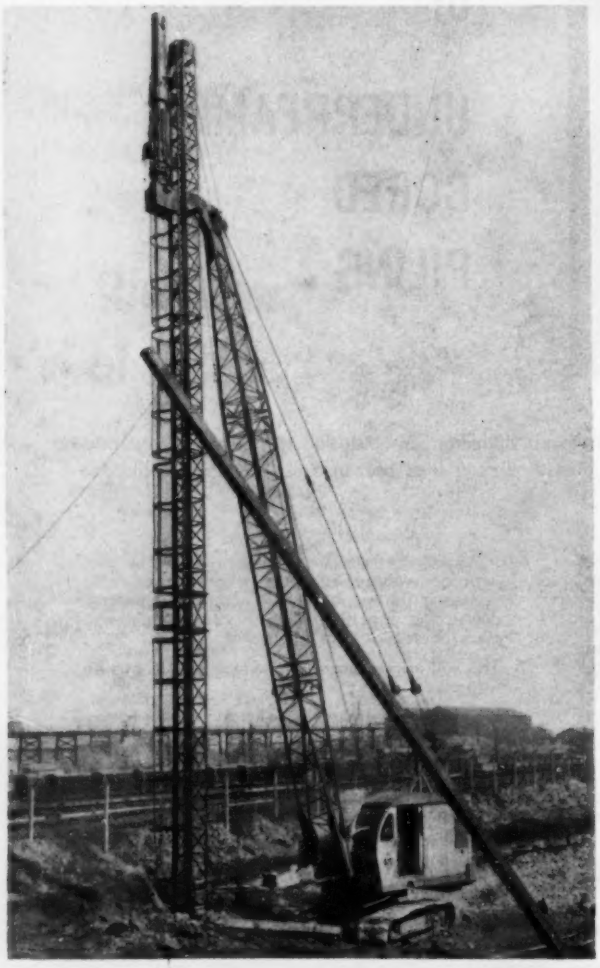

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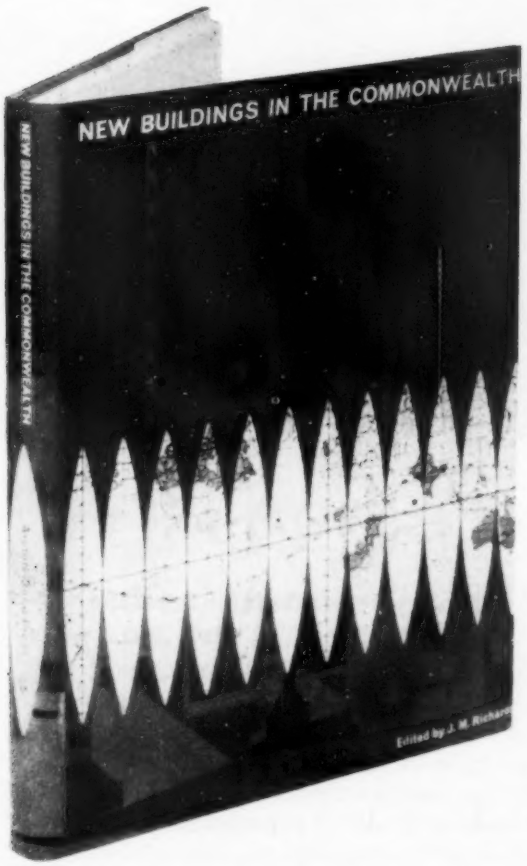

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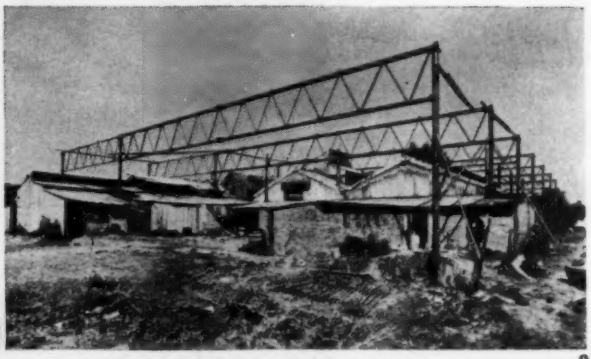

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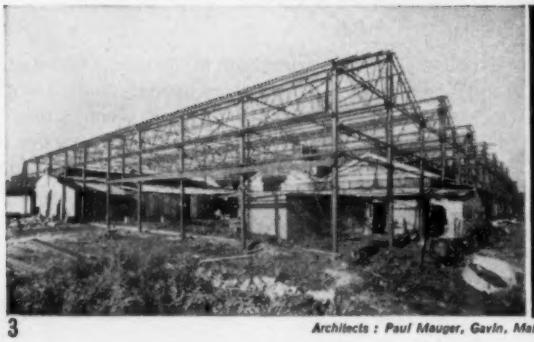

3

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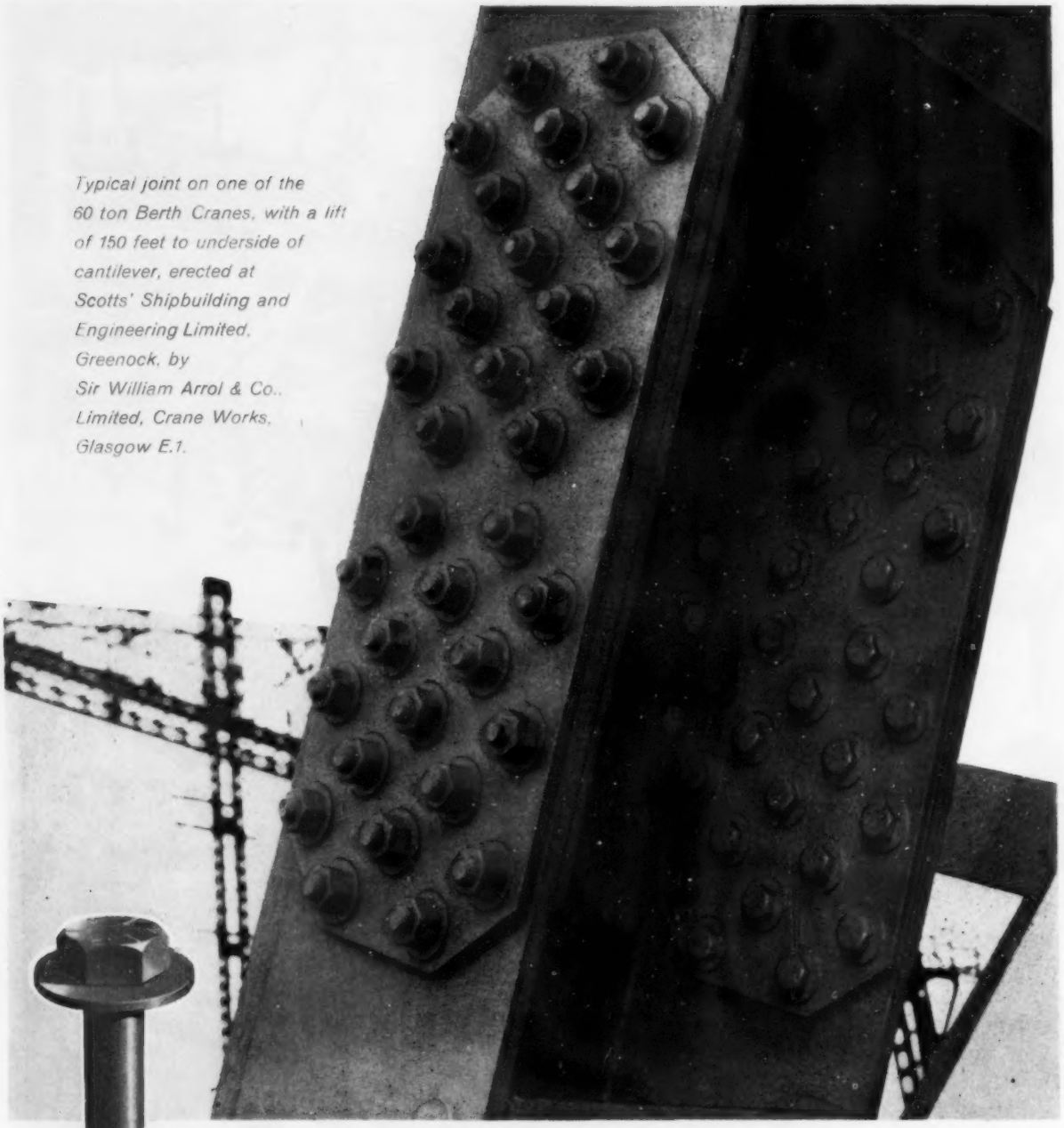

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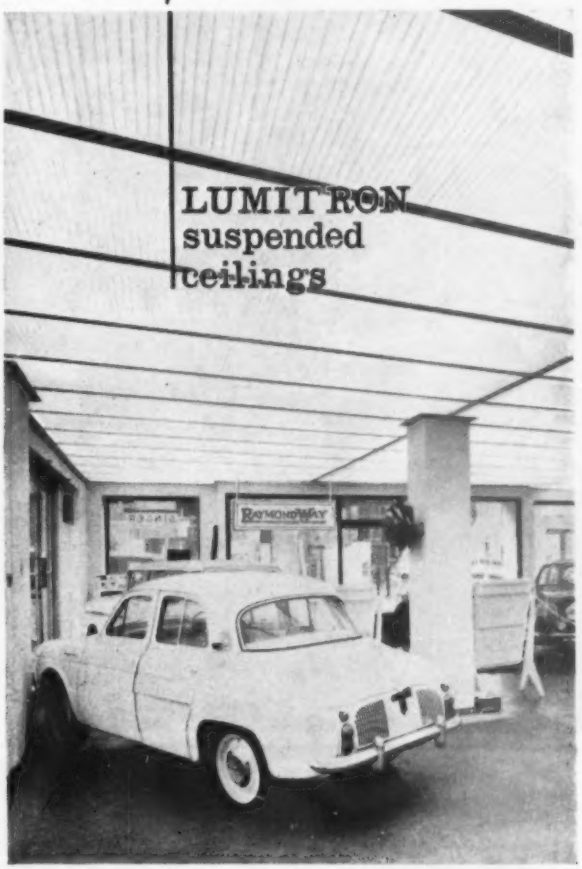

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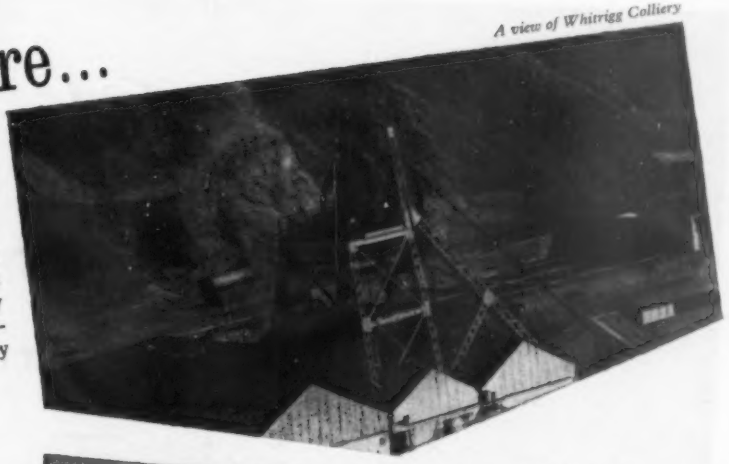

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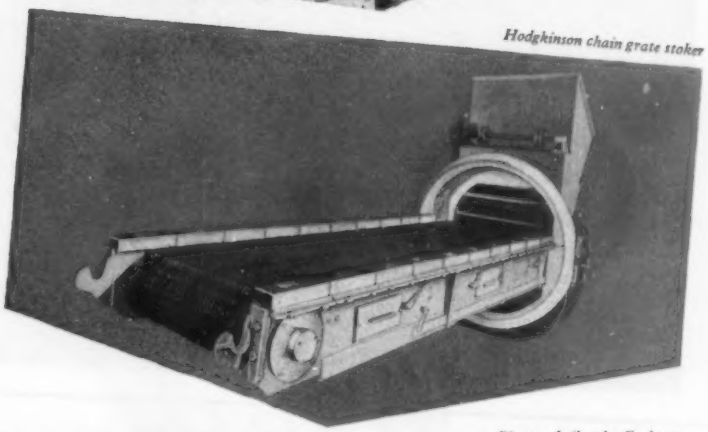

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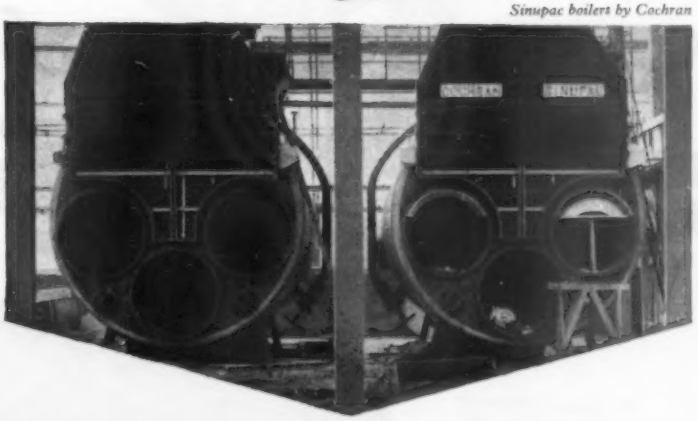

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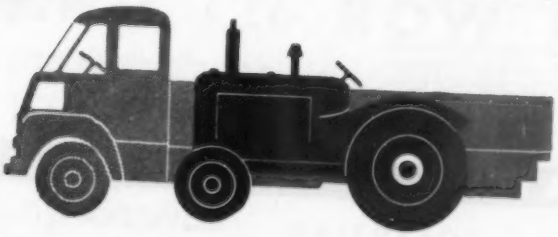

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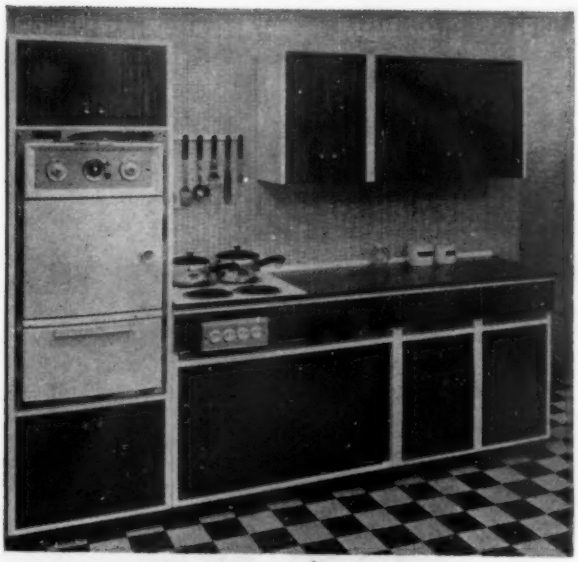

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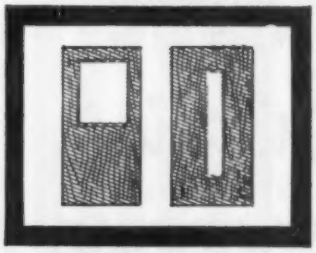

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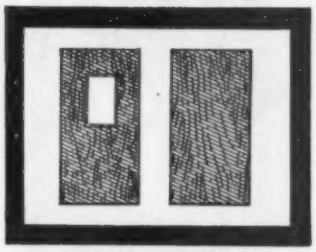

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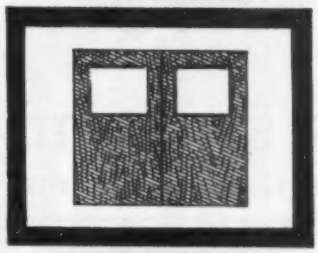

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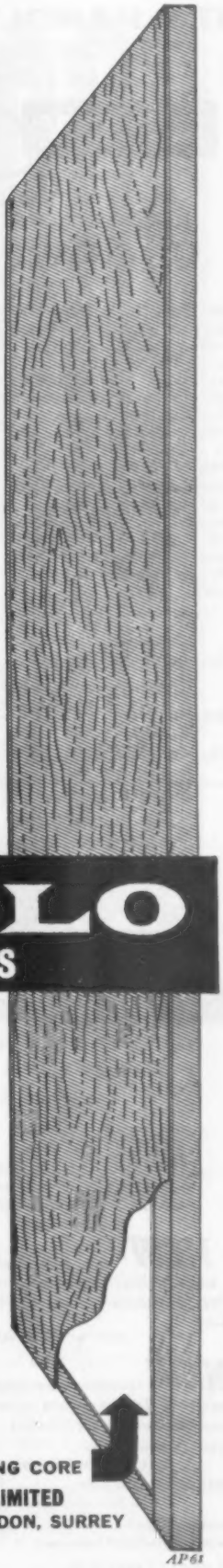

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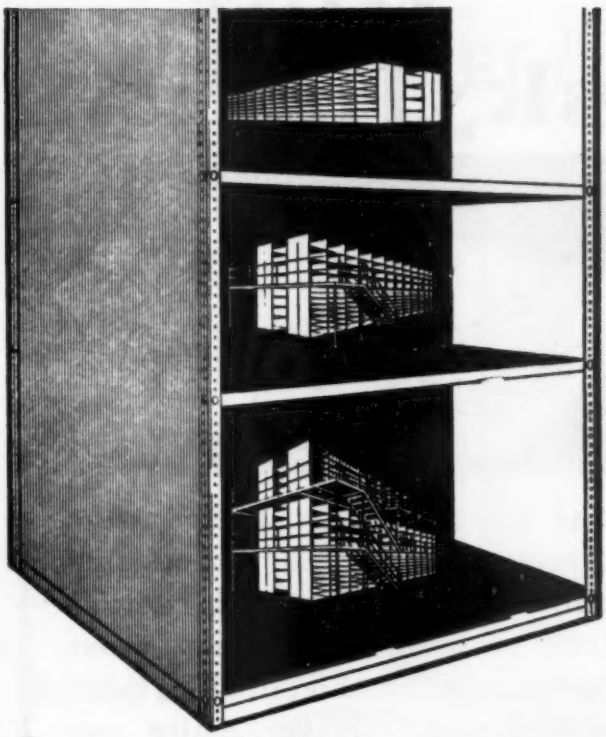

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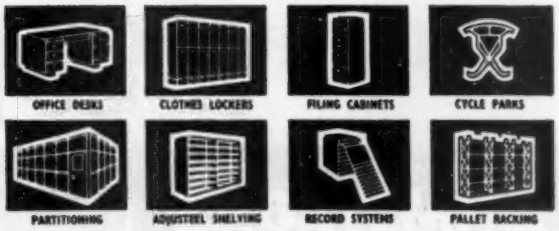

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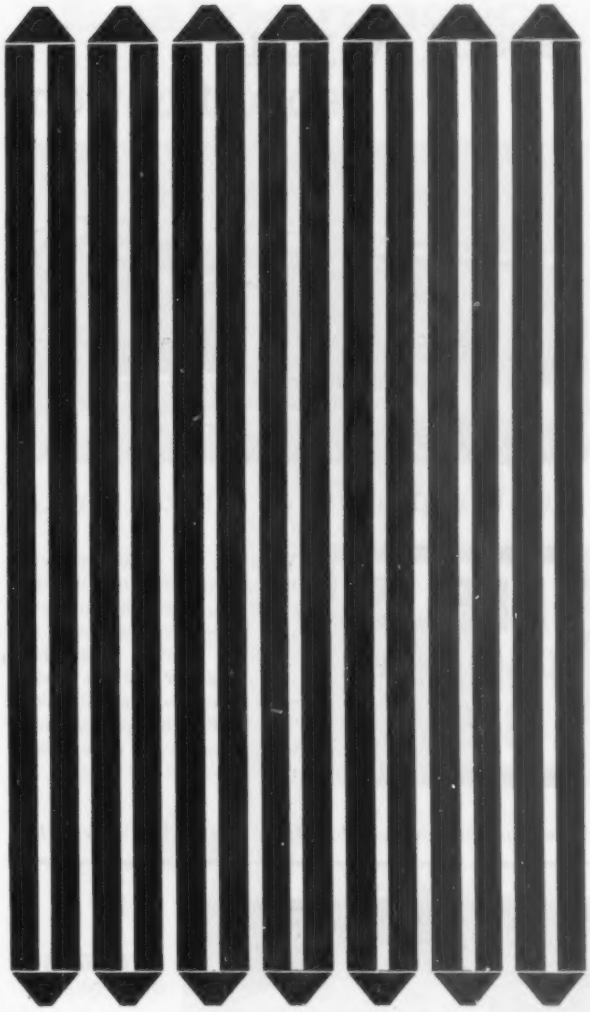

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A new generation of space heating, based on electrical ceiling radiation, developed in Norway and now being installed extensively in the United Kingdom.

The distinctive features of the system are the even distribution of heat at low temperature (80°—90°F.) over wide areas, speed and sensitivity of response by thermostatic control, and semi-storage effects.

There are many advantages: quality of heat, capital costs—not exceeding 5/- per square foot, saving on construction and on building schedules, highly competitive consumption costs.

The system is installed together with most types of conventional ceilings, and is particularly relevant for all new buildings; ceiling heights 7' 6" to 30'. Current installations include office buildings, low-cost and luxury flats, housing, restaurants and shops, childrens homes and laboratories.

ESWA Ltd., 26 Newman St. London W1. tel: LAN 6434/5/6

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 AJ, shall be despatched 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.

CITY OF GLASGOW
ARCHITECTURAL & PLANNING DEPARTMENT
ASSISTANT ARCHITECTS
Salary up to £1,560 p.a.

This comprehensive office has an extremely interesting and vast programme of work to carry out during the next twenty years or so. The architectural and planning works include comprehensive redevelopment of urban areas, multi-storey buildings, schools of all types, colleges and various civic buildings.

The salary scale for these assistantships is up to £1,560 per annum with placing according to experience. Preference given to young and enthusiastic qualified men who have the ability but lack a real opportunity to apply it. There will be scope for personal initiative in this office.

A five-day week is in operation and the usual conditions concerning Superannuation apply.

Advances up to 100 per cent of valuation will be made available, where needed, for the purchase of suitable houses in or near Glasgow by successful applicants.

Please apply on application forms from the Principal Administrative Officer, 20, Trongate, Glasgow, C.1.

A. G. JURY,
City Architect & Director of Planning.
S9917

METROPOLITAN BOROUGH OF BATTERSEA

Applications are invited for the permanent appointment of ASSISTANT BUILDING SURVEYOR, A.P.T. Grade V (£1,310—£1,480 per annum—plus London weighting of £45 per annum).

Applicants must have passed the Final Examination of the Royal Institution of Chartered Surveyors and have experience in maintenance, alteration and conversion works.

Commencing salary according to experience, previous Local Government service not essential.

The appointment is subject to the Local Government Superannuation Acts 1937-1953.

Further particulars and application forms may be obtained from the Borough Engineer & Surveyor, Town Hall, Battersea, S.W.11.

Closing date for applications is 20th November, 1961.

C. M. W. S. FREEMAN,
Town Clerk.
S9928

A vacancy exists for an ASSISTANT ARCHITECT in the office of the Architect, British Railways, Eastern Region.

Applicants should be qualified (A.R.I.B.A.) and have a lively approach to the design of buildings coupled with a sound knowledge of their construction. The office encourages assistants to take responsibility at every stage of a project.

Salary range £1,070—£1,145.

Applications should be made in writing to the Architect, Chief Civil Engineer's Office, King's Cross Station, London, N.1. S9912

LIVERPOOL REGIONAL HOSPITAL BOARD
require
ASSISTANT REGIONAL ARCHITECT
Salary £1,825 × £75 (2) × £100 (2)—£2,175

in the Department of the Regional Architect, T. Noel Mitchell, B.Arch. (Liverpool), F.R.I.B.A.

Graduate of a recognised School of Architecture preferred. High design ability essential. The Department has Principal Assistants—each responsible for a section of work which includes major projects—these being assisted by a number of Senior and Assistant Architects.

The post is superannuable; car mileage and subsistence allowances payable. The Department is in pleasant modern offices in a central position in the city.

Applications to reach me by 20th November, 1961, stating age, education, qualifications, present salary, experience, present and previous posts and names and addresses of three referees (two technical).

VINCENT COLLINGE,
Secretary to the Board.

55, Castle Street,
Liverpool, 2. S9878

CITY OF SHEFFIELD
CITY ENGINEER & SURVEYOR'S DEPARTMENT
AREA PLANNING OFFICER, GRADE B

Applications are invited from suitably qualified persons for the above appointment on the staff of the City Engineer and Surveyor and Town Planning Officer (Mr. C. R. Warman, B.Sc., M.I.C.E., M.I.Mun.E., M.T.P.I.).

The post is established in Grade B (£1,480—£1,670 p.a.).

Candidates should have a Town Planning qualification and an architectural or other suitable additional qualification would be an advantage.

The commencing salary will be in accordance with experience and qualifications.

Contribution will be made towards approved removal expenses.

Superannuable post, N.J.C. Conditions of Service, medical examination.

Applications, stating age, education and training, qualifications, experience, present and past appointments (with dates and salaries) and quoting the names of two referees, should be submitted to the undersigned by the 27th November next.

JOHN HEYS,
Town Clerk.

Town Hall,
Sheffield, 1. S9958

WORCESTERSHIRE COUNTY COUNCIL

Applications are invited for the following posts:—

(1) ARCHITECTURAL ASSISTANT, Grade A.P.T. III (£960—£1,140).
(2) ARCHITECTURAL ASSISTANT, Grade A.P.T. II (£815—£960).

Financial assistance is given for removal expenses and lodging allowances and the Council may be able to assist with housing accommodation. Further particulars and forms of application should be obtained from L. C. Lomas, F.R.I.B.A., County Architect, 14, Castle Street, Worcester, not later than 15th November, 1961. (S.185.) S9879

COUNTY BOROUGH OF STOCKPORT
PLANNING ASSISTANT
GRADES A.P.T. III-IV, £960—£1,310

Applications invited for the above appointment in the Redevelopment Section of the Borough Surveyor and Planning Officer's Department from Chartered Town Planners or Landscape Architects who should preferably have had urban renewal experience. The Department is engaged upon a series of major development schemes including the redevelopment of the town centre and the person appointed will be a member of a small progressive team working on positive projects. Commencing point within the grades according to ability and experience. The post is terminable by one month's notice and subject to N.J.C. Conditions of Service and medical examination. Loan available for house purchase. Applications, outlining personal particulars, qualifications, present and previous appointments with dates and salaries, experience and names and addresses of two referees to Borough Surveyor and Planning Officer, Town Hall, Stockport, by 20th November, 1961. Canvassing disqualifies. Applicants must state if related to any member/senior officer of Council. S9910

CITY OF ROCHESTER
ARCHITECTURAL ASSISTANT
GRADE A.P.T. II (£815—£960)

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

Candidates should have general experience, including the preparation of drawings and specifications, and should have passed the Intermediate Examination of the Royal Institute of British Architects or hold a qualification of equivalent standard. The commencing salary will be according to qualifications and experience.

Housing accommodation will be provided if required, and removal expenses refunded after twelve months' service. Five-day week.

The appointment will be subject to the National Scheme of Conditions of Service, the Local Government Superannuation Acts, and a satisfactory medical examination. One month's notice is required on either side.

Applications, stating age, training, qualifications, present and previous appointments and experience, together with the names and addresses of two persons to whom reference may be made, should be delivered to J. A. Peel, A.M.I.C.E., M.I.Mun.E., City Surveyor, 66, Maidstone Road, Rochester, not later than Wednesday, 22nd November, 1961.

PHILIP H. BARTLETT,
Town Clerk.

Guildhall,
Rochester.
20th October, 1961. S9911

NOTTINGHAMSHIRE COUNTY COUNCIL
COUNTY ARCHITECT'S DEPARTMENT
APPOINTMENT OF
ASSISTANT QUANTITY SURVEYOR

Applications are invited from suitably qualified persons for the post of Assistant Quantity Surveyor, within A.P.T. Grades III/IV, the range of which is £960—£1,310 per annum.

Applicants for the post must be Chartered Quantity Surveyors (A.R.I.C.S.) with experience in taking off quantities, site measurements, interim certificates and final accounts.

Forms of application from W. D. Lacey, County Architect, County Hall, West Bridgford, Nottingham, to whom they should be returned as soon as possible 1053

HUYTON-WITH-ROBY URBAN DISTRICT COUNCIL
ARCHITECTURAL AND HOUSING DEPARTMENT

Applications are invited for the following appointments:—

(a) SENIOR ASSISTANT ARCHITECT (A.P.T. V), £1,310 to £1,480. Candidates must be members of the R.I.B.A. Housing accommodation will be provided if required.
(b) ARCHITECTURAL ASSISTANT (A.P.T. I), £645 to £815.

The appointments will be subject to the Provision of the Local Government Superannuation Acts and N.J.C. Scheme of Conditions of Service as adopted by the Council, and will be terminable by one calendar month's notice on either side.

Applications, stating age, present position and salary, together with the names of two referees, to the Architect and Housing Director, Architectural and Housing Department, "Grasscroft," Archway Road, Huyton, by the 17th November, 1961.

D WILLGOOSE,
Clerk to the Council.

Council Offices,
Derby Road,
Huyton. 9944

LIVERPOOL REGIONAL HOSPITAL BOARD
require
ARCHITECTS

SENIOR ASSISTANT ARCHITECTS, £1,300—£1,600.
ASSISTANT ARCHITECTS, £905—£1,310.
ARCHITECTURAL ASSISTANTS, £625—£960.
ARCHITECTURAL DRAUGHTSMEN, £475—£685.

and
QUANTITY SURVEYORS

SENIOR ASSISTANT QUANTITY SURVEYOR, £1,300—£1,600.
QUANTITY SURVEYING ASSISTANT, £625—£900

in the Department of the Regional Architect, T. Noel Mitchell, B.Arch., F.R.I.B.A. Interesting new building is projected including new Hospitals and the complete replanning of a large number of older Hospitals covering a wide variety of building types.

Posts are superannuable and mileage allowances paid to approved car users.

Applications to reach me by 20th November, 1961, stating post applied for, age, education, qualifications, present salary, experience, present and previous posts and names and addresses of three referees (two technical).

VINCENT COLLINGE,
Secretary to the Board.

55, Castle Street,
Liverpool, 2. S9880

CHERTSEY URBAN DISTRICT COUNCIL
APPOINTMENT OF ASSISTANT ARCHITECT

Applications are invited for the appointment of Assistant Architect at a salary in accordance with Grade A.P.T. IV (£1,140—£1,310 per annum).

The work is of an interesting character, principally multi-storey housing but designs are also to be prepared for a community centre.

This is the senior appointment in the Architectural Section.

Housing available if required.

The appointment is superannuable and subject to a medical examination.

Applications, giving details of experience, etc., to be sent to N. C. Goldsmith, M.B.E., M.I.Mun.E., Engineer & Surveyor, Chertsey Urban District Council, "The Orchard," Staines Lane, Chertsey, Surrey, not later than 15th November, 1961.
26th October, 1961. S9976

NORFOLK COUNTY COUNCIL
COUNTY ARCHITECT'S DEPARTMENT

Applications are invited for the following established posts:—

ASSISTANT ARCHITECT, Grade IV (£1,140—£1,310): must be qualified and have had good general experience.
ARCHITECTURAL ASSISTANT, Grade I (£645—£815).
QUANTITY SURVEYING ASSISTANT, Grade III (£960—£1,140); must have experience in taking off, abstracting, billing and checking final accounts.

Applications, giving details of training, qualifications, age, past and present appointments, and the names of three referees, to County Architect, 27, Thorpe Road, Norwich, by 14th November. S9907

CITY OF CHESTER
CITY ENGINEER & SURVEYOR'S DEPARTMENT

Applications, stating age, education, qualifications and experience, and the name of three referees, are invited for the following posts:—

(a) TWO SENIOR ASSISTANT ARCHITECTS, A.P.T. III-IV.
(b) ONE JUNIOR ARCHITECTURAL ASSISTANT, A.P.T. I-II.
(c) ONE ARCHITECTURAL DRAUGHTSMAN, Misc. V.

Housing accommodation will be available, if required, for posts (a) and (b). Commencing salary within the grades will be determined by qualifications and experience. The Corporation is engaged in a substantial building programme offering varied and interesting experience to successful applicants. Applications should be forwarded to City Engineer and Surveyor, 49, Northgate Street Chester, by November 13th, 1961. S9893

BOROUGH OF BASINGSTOKE
BOROUGH ARCHITECT'S DEPARTMENT

Applications are invited for the following appointments in the Architect's Department of this expanding town.

SENIOR ASSISTANT, Grade IV, within salary range £1,140—£1,310 according to experience. The successful applicant should be an Associate R.I.B.A. and will be required principally to assist in the design of an Indoor Swimming Pool, and must possess experience of this work. Casual user car allowance will be available for this post.

ASSISTANT ARCHITECT, Grade I, within salary range £645—£815 according to experience. Candidates should have reasonable training and experience.

Both posts are pensionable and subject to N.J.C. conditions.

Housing available in due course. Assistance with removal expenses. Five-day week.

Details giving qualifications, age, training, experience, etc., and names and addresses of two referees, to be sent to the Borough Architect, E. Almond, Dipl. Arch., A.R.I.B.A., Municipal Buildings, Basingstoke, Hants., by 14th November, 1961. S9938

RADNORSHIRE COUNTY COUNCIL

Applications are invited for the following permanent appointments on the established staff of the County Architect's Department:

ASSISTANT ARCHITECT. Salary Grade A.P.T. IV (£1,140—£1,310 p.a.).

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 building works.

The Council have a varied and interesting building programme on hand including Junior and Secondary Schools, police houses, and old people's homes.

ASSISTANT QUANTITY SURVEYOR. Salary Grade A.P.T. II (£815—£960).

Preferably qualified to A.R.I.C.S. Intermediate standard or equivalent.

Duties will include abstracting and billing, site measurements and some taking off under supervision of the Chief Quantity Surveyor.

The appointments will be subject to the National Scheme of Conditions of Service; to the Local Government Superannuation Acts and to termination by one month's notice in writing by either party.

A lodging allowance, proportion of approved removal expenses and rail fare home every three weeks for a limited period will be paid to a married man appointed to these posts.

Applications, stating age, qualifications and experience, with the names and addresses of two persons to whom reference may be made, must be received by the undersigned by not later than the 16th November, 1961.

D. C. S. LANE,
Clerk of the Council.

County Hall,
Llandrindod Wells,
Radnorshire. S9972

EXETER CITY COUNCIL
CITY ARCHITECT'S DEPARTMENT

SENIOR ASSISTANT ARCHITECTS required on A.P.T. Grade III (£960 to £1,140) and A.P.T. Grade IV (£1,140 to £1,310) on the established staff to work on an interesting and varied programme of work. Entry point on the salary grade will depend on experience.

Provision of housing accommodation will be considered and removal expenses will be paid.

Applicants must be Associate Members of the R.I.B.A., N.J.C. Conditions of Service. Successful candidates will be required to pass a medical examination.

Applications, stating age, experience and qualifications, should be received by the City Architect, Municipal Offices, Exeter, not later than 17th November, 1961.

S9964

ARCHITECTS
BOROUGH OF TOTTENHAM—MIDDLESEX
Population 116,000

Applications are invited from Architects who wish to be engaged on extensive schemes of urban renewal including layouts for housing estates and shopping precincts, the design and construction of tall flats and other domestic buildings, public buildings and school work.

(a) SENIOR ASSISTANT ARCHITECT:—
J.N.C. "A"—£1,310 to £1,565 per annum.

(b) SENIOR ASSISTANT ARCHITECTS:—
A.P.T. Grade V—£1,310 to £1,480 per annum.

(c) ASSISTANT ARCHITECT:—
A.P.T. Grade IV—£1,140 to £1,310 per annum.

(d) ARCHITECTURAL ASSISTANTS:—
A.P.T. Grade II—£815 to £960 per annum.

All appointments will be to the established staff and commencing salaries will be according to experience and ability. London weighting (£15 to £45 p.a.) is payable in addition to posts (b), (c) and (d).

Applicants for posts—
(a), (b) and (c) should hold a Final professional qualification; (d) should have passed R.I.B.A. Intermediate Examination or equivalent.

Five-day week; part removal expenses reimbursed; staff restaurant facilities.

Application Form, obtainable from the Borough Engineer and Surveyor (AJ), Town Hall, N.15, should be returned to him not later than 20th November, 1961.

M. LINDSAY TAYLOR,
Town Clerk.

1039

TARVIN RURAL DISTRICT COUNCIL
ASSISTANT (ARCHITECT'S DEPARTMENT)

Applications are invited for the appointment of Assistant in the office of the Council's Architect.

Applicants must have had sound training by pupilage and had previous experience in design and construction of building works, particularly in relation to housing.

The salary will be in accordance with a point within Grade I, A.P.T. rising to A.P.T. II, plus travelling allowance for a 10 H.P. Car in accordance with the Whitley Council Scale.

The appointment will be subject to one month's notice in writing on either side.

Applications stating age, qualifications and experience, together with copies of three recent testimonials should be addressed to Mr. Thomas Pritchard, L.R.I.B.A., M.I.Mun.E., and enclosed in an envelope endorsed "Assistant (Architect's Department)" and should reach this office not later than Monday, November 20th, 1961.

(Signed) J. L. VINCENT,
Clerk to the Council.

Westminster Buildings,
Newgate Street,
Chester.
31st October, 1961. S1048

ASSISTANT ARCHITECT required by HAYES & HARLINGTON U.D.C. Salary within grade APT.IV i.e. £1,140—£1,310 p.a. plus appropriate London "Weighting." Preference given to finalists of the RIBA. Successful candidate must be capable of preparing sketch designs, full working drawings, specifications, supervision of building contracts, etc. Housing accommodation provided if necessary. Five day week. Further particulars and conditions of service and form of application obtainable from the undersigned, to which when completed must be returned by 28 November, 1961.

GEORGE HOOPER,
Clerk and Solicitor.

Town Hall,
Hayes, Middlesex. S1041

AIR MINISTRY WORKS DEPARTMENT invites applications for ARCHITECTURAL ASSISTANTS, primarily for the architectural branch of the designs office in London.

SALARY (inner London Scale):
Grade II: £1,048—£1,220.
Grade III: £658—£1,048 (£866 at age 25).

Starting salary depends on age, qualifications and experience.

Qualifications and Experience: The work includes a wide range of domestic, administrative and technical buildings in varying forms of construction offering scope for imaginative design for which adequate training and architectural office experience is necessary. O.N.C.(Bldg.) some advantage for Grade III posts but progressive design ability is sought for Grade II. Financial assistance and time off may be allowed for recognised courses of study, *e.g.*, R.I.B.A.

Prospects: Appointments are non-pensionable (retirement/resignation gratuity payable after 5 years' or longer service) but good opportunities exist both for establishment to pensionable posts, when all service counts, and for advancement to the higher grades in which posts number some 35. Higher grade salaries vary between £1,277 and £2,015 (inner London scale) and vacancies are, as a rule, filled by promotion of serving staff. Opportunities for tours of duty overseas, when additional allowances ranging, at present, up to £1,800 p.a. (depending on circumstances) are payable. Five-day week with 26½ days' paid leave per year initially including public holidays.

Applicants, who must be natural born British subjects, should write to AIR MINISTRY, W.G.d. LACON HOUSE, THEOBALDS ROAD, LONDON, W.C.1, or to any Employment Exchange (quoting Kings Cross, 838) giving age, details of training, qualifications and full particulars of former posts held. Candidates selected will normally be interviewed in London and certain expenses reimbursed. S9460

COUNTY BOROUGH OF EASTBOURNE
SENIOR TOWN PLANNING ASSISTANT
Salary Grade APT 5: (£1,310/£1,480 p.a.)
ASSISTANT ARCHITECT
Salary Grade APT 4: (£1,140/£1,310 p.a.)

APPLICATIONS are invited for the above appointments; commencing salary to be in accordance with qualifications and experience.

The Council will provide housing accommodation if required.

Full particulars of age, present position and salary, qualifications and experience, together with the names of two referees to be sent to the undersigned by noon on MONDAY, 20TH NOVEMBER, 1961.

R. WILLIAMS, B.Sc., A.M.I.C.E.,
Borough Engineer & Surveyor.

2/4 Saffrons Road,
Eastbourne, Sussex.
26th October, 1961 1050

RUTLAND COUNTY COUNCIL
APPOINTMENT OF ASSISTANT ARCHITECT
A.P.T. IV (£1,140—£1,310).

Applications are invited from qualified Architects to work on a varied programme of new buildings.

Details of age, qualifications and experience, with names and addresses of two persons to whom reference may be made, to be sent to the County Architect and Planning Officer, T. Brian Kennedy, A.R.I.B.A., M.T.P.I., County Offices, Oakham, not later than 13th November, 1961.

A. BOND,
Clerk of the County Council.

S1023

CITY AND COUNTY OF NEWCASTLE UPON TYNE
CITY ARCHITECT'S DEPARTMENT

A unique opportunity exists in this office to take part in one of the most ambitious programmes of varied building works in the country, and vacancies in the establishment occur as follows:—

ARCHITECTS—who will be considered on their ability in design, experience and architectural outlook.

J.N.C. "D" £1,710—£1,975 per annum. (New Town Hall Section.)
J.N.C. "C" £1,560—£1,825 per annum. (General Section and Re-Housing Sections.)
J.N.C. "B" £1,410—£1,670 per annum. (Housing Section.)
J.N.C. "A" £1,365—£1,565 per annum. (Housing Section.)
A.P.T. V £1,310—£1,480 per annum. (General, Education, Housing, Re-Housing and New Town Hall Sections.)
A.P.T. IV £1,140—£1,310 per annum. (General, Education and Housing Sections.)
A.P.T. III £960—£1,140 per annum. (General, Housing and Re-Housing Sections.)
A.P.T. II £815—£960 per annum. (General and Re-Housing Sections.)
A.P.T. I £645—£815 per annum. (Housing and Re-Housing Sections.)

The Department is engaged upon a wide and varied programme of major redevelopment schemes, embracing multi-storey flats, shopping precincts and associated community buildings, one of which schemes is the Scotswood Road Redevelopment Area to re-house approximately 5,000 people, and which is expected to cost in the region of £12 million.

Planning work has now commenced on the new Education Precinct in the central area, comprising Colleges of Further Education, Art and Industrial Design, Drama, Commerce, and Multi-storey Hostels, which will be the largest development of its kind in the country.

Further projects include: Airport Terminal; Abattoir and Fatstock Market; Vegetable Markets; Central Library; and Divisional Police Headquarters, etc., and a varied programme of normal Housing development of a stimulating character.

The Department is also engaged on the New Town Hall, where an exceptional opportunity is presented for working on a building of some £4 million in value, and being executed in materials of the highest quality.

QUANTITY SURVEYORS:
A.P.T. IV £1,140—£1,310 per annum.
A.P.T. I £645—£815 per annum.

LANDSCAPE ARCHITECT:
J.N.C. "A" £1,365—£1,565 per annum.

Applicants will be considered on their ability in design, experience and capacity to carry out creative work, and the successful candidate will be required to prepare comprehensive schemes of Landscaping for the major Redevelopment Areas, Housing Estates, New Town Hall, Education Precinct, etc.

Applicants for posts in A.P.T. III and above must have appropriate professional qualifications. The City Council has agreed (*a*) to pay 50 per cent. of the total cost of removal expenses of successful candidates up to a maximum grant of £50 in those cases where the Committee feels it is warranted, subject to the successful candidate remaining in the post for a minimum period of two years from the date of taking up the appointment, otherwise refund of the grant will be required; (*b*) to offer the successful candidates, in cases where the Committee deems it is warranted, the tenancy of a dwelling to be let at an economic rent and (*c*) draw candidates' attention to the facilities under the Council's scheme for advance on mortgage, whereby in approved cases a loan for the purchase of a house up to 100 per cent. of valuation may be granted by the Council. Those wishing to take part in one of Britain's most stimulating programmes should apply immediately for further details and forms of application to George Kenyon, A.R.I.B.A., A.M.T.P.I., City Architect, 18 Cloth Market, Newcastle upon Tyne, 1, indicating the grade for which they wish to be considered.

JOHN ATKINSON,
Town Clerk.

Town Hall,
Newcastle upon Tyne, 1.
2nd October, 1961. TC9623

BOROUGH OF SCUNTHORPE
(Population—67,000; Area—7,895 acres; R.V. £1 562,541)
APPOINTMENT OF SENIOR ASSISTANT ARCHITECT
Grade A.P.T. IV

Applications are invited for the above appointment in the Borough Surveyor's Department at a salary in accordance with Grade A.P.T. IV (£1,140—£1,310 p.a.).

Applicants should be qualified Architects, and the commencing salary will be fixed within the Grade according to qualifications and experience.

Housing accommodation available if required. Approved removal expenses reimbursed in full. Five-day working week.

Applications, stating age, details of present and past appointments, training, qualifications and experience, together with the names of two persons to whom reference may be made, should be sent to F. J. Bowyer, A.M.I.C.E., M.I.Mun.E., Borough Engineer & Surveyor, Borough Surveyor's Department, Laneham Street, Scunthorpe, on or before Friday, 24th November, 1961. 1058

WARWICKSHIRE COUNTY COUNCIL
ARCHITECT'S DEPARTMENT

ASSISTANT ARCHITECTS, Grade A.P.T. IV (£1,140—£1,310).

Applications are invited from qualified architects. The persons appointed will work in groups on large projects and an opportunity will be given to men with enthusiasm and ability to design and carry out projects under a group architect.

ARCHITECTURAL ASSISTANTS, Grade A.P.T. II (£815—£960).

Vacancies exist for assistants who are up to Intermediate R.I.B.A. standard and who require experience in a variety of interesting projects.

The commencing salary can be within the grade according to ability. Five-day week worked. The Council have schemes for the payment of removal expenses and a lodging allowance to married officers. Application forms and full conditions applicable to the appointments can be obtained from Eric Davies, F.R.I.B.A., A.M.T.P.I., County Architect, Shire Hall, Warwick.

L. EDGAR STEPHENS,
Clerk of the Council.

27th October, 1961. S1010

BOROUGH OF RICHMOND (SURREY)
APPOINTMENT OF SENIOR ASSISTANT ARCHITECT

Applications are invited from qualified Architects for the appointment of SENIOR ASSISTANT ARCHITECT at a salary in accordance with Grade A.P.T. IV (£1,140—£1,310) plus London Weighting.

Applications should be delivered to the Borough Engineer and Surveyor, King's Road, Richmond, Surrey, not later than 27th November, 1961, giving the names of three referees and stating relationship, if any, to Members of the Council or Senior Officers.

Canvassing prohibited. No assistance can be given with housing.

CLIFFORD HEYWORTH,
Town Clerk.

Town Hall,
Richmond,
Surrey. S1042

COVENTRY CITY
SENIOR GROUP HOUSING ARCHITECT
£1,560 to £1,825—Scale "C"

Applications invited for deputy to Principal Housing Architect.

Design ability, enthusiasm and drive required to implement urban renewal and neighbourhood projects on imaginative basis. New ideas encouraged.

Commencing salary according experience. Application forms returnable by 27th November, 1961, to Council House.

ARTHUR LING,
City Architect.
S1051

BOROUGH OF TAUNTON
ARCHITECT'S DEPARTMENT

Applications are invited for the following appointments in the Borough Architect's Department.

ASSISTANT ARCHITECTS, Grade A.P.T. III/IV (£960—£1,140—£1,310 p.a.).

The Council have an interesting programme of estate development and re-development schemes including flatted accommodation, groups of shops, old persons accommodation, market offices and other ancillary buildings.

The posts are superannuable, subject to medical examination and to National Conditions of Service. Salary placing according to qualifications and experience. Applications stating age, present position and salary, qualifications, experience and names of two referees to be sent to C. Bacon, F.R.I.B.A., Borough Architect, Flook House, Station Road, Taunton, within 14 days of the appearance of this advertisement.

Housing accommodation will be made available to suitable applicants if required.

K. A. HORNE,
Town Clerk.
S1052

COUNTY BOROUGH OF DONCASTER

Vacancies exist in the Borough Architect's Department for (*a*) ASSISTANT ARCHITECTS, and (*b*) ARCHITECTURAL ASSISTANTS. Salaries in accordance with (*a*) A.P.T. III/IV (£960—£1,310) and A.P.T. IV (£1,140—£1,310) and (*b*) A.P.T. I (£645—£815).

Final qualifications, R.I.B.A., required for (*a*). Intermediate qualification, R.I.B.A., required for (*b*).

Posts are superannuable, subject to one month's notice on either side and appointment subject to the passing of a medical examination. Application forms obtainable from the Borough Architect, 15 South Parade, Doncaster, to whom they should be returned by 13th November, 1961.

Five-day week; 50 per cent. of removal expenses paid and housing accommodation provided, where appropriate.

Canvassing will disqualify.

H. R. WORMALD,
Town Clerk.

October, 1961. 1001

CORBY DEVELOPMENT CORPORATION
LANDSCAPE ARCHITECT

Applications are invited for an appointment as Landscape Architect in the department of the Chief Architect at a salary within A.P.T. Grade III (£960—£1,140). The commencing salary within this grade will depend upon experience and qualifications.

Housing is available and removal expenses will be paid. There is a Superannuation Scheme either under the conditions of the Local Government Superannuation Act or under the New Towns Pension Fund.

Apply by Monday, 20th November, 1961, stating age, present appointment and salary, details of qualifications and experience and the names of two referees, to:

R. F. BROOKS GRUNDY,
General Manager,
Corby Development Corporation,
Spencer House,
Corby,
Northants. 1007

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. 1004

BOROUGH OF NEWCASTLE-UNDER-LYME
REQUIRES

(*a*) ASSISTANT ARCHITECT, Grade A.P.T. IV (£1,140—£1,310 p.a.).

(*b*) ARCHITECTURAL ASSISTANT, Grade A.P.T. II (£815—£960 p.a.).

Qualifications for the posts: (*a*) A.R.I.B.A., (*b*) Intermediate R.I.B.A.

Commencing salaries will be in accordance with experience and ability. The person appointed for post (*b*) will be allowed to attend a one-day per week school course leading to the Final examination.

The Department's programme includes: Housing, shops, offices and new schools.

Favourable consideration will be given to the provision of housing accommodation in suitable cases.

Application forms and further particulars may be obtained from the Borough Engineer & Surveyor, Lancaster Building, High Street, Newcastle, Staffs., and should be returned to him not later than Wednesday, 22nd November, 1961.

C. J. MORTON,
Town Clerk.
1006

METROPOLITAN BOROUGH OF HAMPSTEAD
APPOINTMENT OF
CHIEF PLANNING ASSISTANT
Lettered Scale "A" (maximum £1,565)

Applications are invited for the above-mentioned appointment in the Borough Engineer's Department.

Candidates should have practical knowledge and experience of the Town and Country Planning Acts and Building Regulations and Byelaws, and be in possession of the appropriate qualifications.

The Chief Planning Assistant, subject to overall supervision, will be in charge of the planning section of the department.

A medical examination is required.

Housing accommodation cannot be provided.

Applications suitably endorsed and giving the names of two persons to whom reference may be made should be sent to the Town Clerk (A.J.), Town Hall, Haverstock Hill, N.W.3, not later than the 14th November, 1961. 9992

CITY OF MANCHESTER

The Housing Committee is engaged upon a very large programme of redevelopment of Central Areas of the City and the development of Overspill sites beyond the City boundaries and requires the services of Architects and Quantity Surveyors with imagination and initiative. There are now opportunities to join the existing young and enthusiastic staff in exciting work which offers ample scope for the design of dwellings of all types and the supervision of large-scale contracts.

Applications are therefore invited for the following posts from suitably qualified persons, not necessarily experienced in Local Authority work.

PRINCIPAL ASSISTANT ARCHITECTS, J.N.C. Scale "C," £1,560—£1,825.

SENIOR ASSISTANT ARCHITECTS, J.N.C. Scale A/B, £1,375—£1,670.

ASSISTANT ARCHITECTS, A.P.T. IV/V, £1,140—£1,480.

ARCHITECTURAL ASSISTANTS, A.P.T. III, £960—£1,140.

SENIOR ASSISTANT QUANTITY SURVEYORS, J.N.C. Scale A/C, £1,375—£1,670.

ASSISTANT QUANTITY SURVEYORS, A.P.T. IV/V, £1,140—£1,480.

QUANTITY SURVEYOR'S ASSISTANT, A.P.T. III, £960—£1,140.

WORKERS-UP, A.P.T. I, £645—£815.

Forms of application may be obtained from the Director of Housing, Town Hall, Manchester, 2, and must be returned by 22nd November, 1961.

Consideration may be given to the provision of housing accommodation together with assistance in removal expenses in certain cases. 9991

COUNTY COUNCIL OF DUNBARTON
COUNTY COUNCIL OF DUMBARTON

Applications are invited for the following posts in the County Architect's Department of the County Council:—

SENIOR ASSISTANT ARCHITECTS
£640 to £845 per annum.
ASSISTANT ARCHITECTS
£850 to £1,270 per annum.
ASSISTANT ARCHITECTS
(Part Qualified)
£640 to £845 per annum.

Applicants for the posts of Senior Assistant must be A.R.I.B.A., preferably with considerable experience in housing, schools and other local authority work. The posts are superannuable. Placing on the scale will be given to Assistant Architects according to experience and qualifications. Five-day week. The provision of housing accommodation will be considered. Canvassing in any form will disqualify and relationship to any member or senior officer of the County Council must be disclosed.

Applications, stating age, experience and qualifications, along with the names and addresses of two referees, should be lodged with the County Architect, Ferry Road, Old Kilpatrick, within fourteen days from the date of this advertisement.

JOHN F. MILLER,
County Clerk.

County Buildings,
Dumbarton. 1005

WILLIAM WILLETT
LIMITED

Charles Neale Investments Ltd. announce that they have now acquired control of the Willett Group of Companies. All the business activities previously carried on by that Group will be continued.

Both old and new clients or associates can be assured that any work carried out on their behalf will be dealt with efficiently and promptly.

Arrangements are being made for a planned expansion policy and anyone interested in existing facilities or taking part in future growth is invited to communicate with :

CHARLES A. NEALE
WILLIAM WILLETT LIMITED,
Sloan Square, London, S.W.1.

Architectural Assistant

Architectural Assistant required to work in the Architectural Section of a Design Department. The work is mainly concerned with industrial buildings, offices and general schemes. The work is carried out under the direction of a Chartered Architect.

Applicants should hold at least intermediate R.I.B.A. or equivalent. Industrial experience an advantage.

The company offers excellent employee benefits, including an annual bonus, a voluntary part contributory Life Insurance Plan and a Pension Scheme.

Please apply quoting JAW/15

Men's Personnel Department,
KODAK LIMITED (FACTORIES),
Harrow, Middlesex.

ARCHITECTURAL
AND
JUNIOR ARCHITECTURAL ASSISTANTS

The East Midlands Division of the National Coal Board has vacancies as follows:—

ARCHITECTURAL ASSISTANTS
(Salaries from £665—£1,275).

Commencing salary will depend on qualifications and experience within the scale of £665 by £30 to £1,000 or a range of £825 to £1,275.
Candidates should preferably be of R.I.B.A. Intermediate standard, although consideration will be given to those without this qualification who have considerable experience of the preparation of working drawings, specifications and general office routine under the supervision of a qualified Architect.

JUNIOR ARCHITECTURAL ASSISTANTS

Salary scale 84s. at 15, rising by annual increments to 228s. 6d. at age 25.
Preference will be given to those candidates with previous experience in an Architect's office.
Superannuation rights under Local Authority and certain other schemes are transferable.
Interesting, worthwhile work with the opportunity of acquiring wide experience on industrial and welfare buildings and the design of offices, laboratories, etc.
Applications, stating age and giving details of education, qualifications and experience should be made in writing to:

DIVISIONAL CHIEF STAFF OFFICER,
NATIONAL COAL BOARD,
EAST MIDLANDS DIVISION,
SHERWOOD LODGE, ARNOLD, NR. NOTTINGHAM
quoting S.V. 1156

opportunity with Esso in Head Office Architect's Group

Architectural Assistant (Ref. 373/AJ). Candidates should be of Inter. R.I.B.A. standard. They should be cost conscious and have a sound knowledge of building construction and be capable of producing good design.

Building Surveyor (Ref. 374/AJ). Inter or Final R.I.C.S. is required. Experience in job organisation, contract procedure and the preparation of Bills of Quantity if necessary.

Candidates should be between 25–30. An imaginative outlook is desirable. Duties will be concerned with the design and co-ordination of service station construction by field teams. There will be occasions for special studies on new construction methods. Some travelling in the U.K. will be necessary.

There is a full range of benefits, including contributory pension plan, sickness and accident benefit scheme and staff development programme.

Applications, stating salary required and full details to

Head of Recruitment
Esso Petroleum Company Limited
16 Charles II Street
Haymarket
LONDON SW1

NEWCASTLE REGIONAL HOSPITAL BOARD
SPECIAL AREA COMMITTEE FOR CUMBERLAND AND NORTH WESTMORLAND
APPOINTMENT OF ASSISTANT ARCHITECT

The Committee has a vacancy for a permanent (superannuable) appointment as subscribed.

The Carlisle Area-office of the Regional Architect's Department deals with the development of the hospital service in Cumberland and North Westmorland (embracing a considerable part of the Lake District National Park) and a modified form of five-day week is in operation.

The appointment is for an Assistant Architect and the salary scale is £905 × £35 (1) × £45 (5) × £50 (2)—£1,310, the commencing salary being at a point taking account of relevant practical experience appropriate to the post, and of the applicant's age.

Applicants must be Associates of the Royal Institute of British Architects, experience of hospital work is not essential.

Applications stating age, qualifications, past and present appointments, present salary and details of experience, together with the names of three referees (of whom at least two must be architects) should be forwarded to the Clerk to the Special Area Committee, 72 Warwick Road, Carlisle, within 14 days of the appearance of this advertisement.

W. J. BALL,
Clerk to the Special Area Committee.

72, Warwick Road,
Carlisle. 1015

BOROUGH OF SWINDON
ARCHITECTURAL ASSISTANT

Applications are invited for the above appointment in the Borough Architect's Department at a salary within A.P.T. Grades III/IV (£960—£1,310), according to experience.

Applicants must have passed the Final Examination of the Royal Institute of British Architects.

The Department is engaged in a large and varied programme of development, including housing schemes, neighbourhood shopping centres, civic works and industrial buildings.

Housing accommodation and assistance with removal expenses may be offered.

Applications, on forms to be obtained from the Town Clerk, Civic Offices, Swindon, must be returned by 17th November, 1961 1017

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD

Two SENIOR ARCHITECTS are now being appointed to complete recently formed teams of young Architects engaged on the new hospital programme.

The Board is working on selected prototype schemes where basic research is necessary and a high standard of design is obligatory.

Salary scale rising to £1,650 p.a. (including London weighting).

Hospital experience while advantageous is not essential.

Applications containing age, present salary, experience, and the names of two referees, to be made to the undersigned at 40, Eastbourne Terrace, London, W.2, by 18th November.

E. G. BRAITHWAITE.
Secretary. 1019

AIR MINISTRY WORKS DEPARTMENT invites applications for QUANTITY SURVEYING ASSISTANT, Grade III, posts at R.A.F. and Ministry of Aviation stations throughout the United Kingdom.

Salary (National Rate) Grade III, £697—£988 (£749 at age 23). Starting salary depends on age, qualifications and experience.

Qualifications and Experience. Work includes abstracting and billing, site measurement and preparation of estimates. Candidates who must be natural born British subjects must hold O.N.C. (Building or Builders Quantities) or equivalent and have had good experience under Quantity Surveyor or Building Contractor. Knowledge of W.D. schedule an advantage. Financial assistance and time off allowed for recognised courses of study leading to higher qualifications.

Prospects. Appointments are non-pensionable (retirement/resignation gratuity payable after five years or longer service) but good opportunities exist both for establishment to pensionable posts, when all service counts, and for advancement to the higher grades in which posts number some 180. Higher grade salaries vary between £988 and £1,747 (National rate) and vacancies are, as a rule, filled by promotion of serving staff. Opportunities for tours of duty overseas, when additional allowances ranging, at present, up to £1,800 p.a. (depending on circumstances) are payable in addition to a higher salary. Five-day week with 26½ days' paid leave per year initially including public holidays.

Forms from Manager (PE.2), Ministry of Labour, Professional & Executive Register, Atlantic House, Farringdon Street, London, E.C.4. Candidates selected will be interviewed in Air Ministry, London, and certain expenses reimbursed. S9987

ASSISTANT TO DIVISIONAL SURVEYOR required for office managing large number of scattered properties. Applicants must be members of a recognised professional institute with sound experience in all aspects of general estate management, particularly maintenance of buildings and plant alterations and minor new works. Travel involved. Salary range £1,410—£1,525 per annum. Applications giving age, experience and qualifications to Divisional Manager, British Road Services Limited (S.V.154), 238 City Road, London, E.C.1. 1029

CENTRAL ELECTRICITY GENERATING BOARD
SOUTH EASTERN REGION
NORTH THAMES DIVISION

Applications are invited for the following appointment in the Generation Department (Construction Section) at Divisional Headquarters, Cockfosters in North London.

ARCHITECTURAL DRAUGHTSMAN

Salary £950—£1,215 per annum (inclusive of London weighting).

The commencing salary will depend upon the duties and responsibilities.

Applicants should have had experience in the preparation of working drawings, details, and specifications in connection with industrial buildings.

Applicants should have technical qualifications of Intermediate R.I.B.A. standard, and had previous office experience and a good knowledge of building construction.

Applications, quoting reference S.V. No. 1508, stating age, qualifications, experience and present position should be sent to the Assistant Regional Personnel Officer, Central Electricity Generating Board, South Eastern Region, North Thames Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts., to arrive not later than 18th November, 1961.

F. W. SKELCHER.
Assistant Regional Director. 9984

BOROUGH OF MANSFIELD
BOROUGH ENGINEER AND SURVEYOR'S DEPARTMENT

Applications are invited for the following appointments in the Architectural Section of the Borough Engineer and Surveyor's Department:—

(*a*) ARCHITECTURAL ASSISTANT, Grades III/IV (£960—£1,310 per annum).
(*b*) GENERAL ARCHITECTURAL ASSISTANT, Grade II (£815—£916 per annum).
(*c*) JUNIOR ARCHITECTURAL ASSISTANT, Grade A.P.T. I (£645—£815 per annum).

Applicants for appointment (*a*) must be Corporate Members of the R.I.B.A. and for (*b*) must have passed the Intermediate Examination of the R.I.B.A., whilst for appointment (*c*) details of training and experience should be stated.

A house on service tenancy may be rented by the successful applicant for appointment (*a*).

Applications, stating age, marital state, training, past and present appointments with salary, and experience, together with the names of three referees should be sent to the Borough Engineer and Surveyor, Carr Bank, Mansfield, Notts., to arrive not later than Monday, 27th November, 1961.

S. W. B. CHRISTMAS,
Town Clerk.

Carr Bank,
Mansfield. 1011

WEST SUSSEX COUNTY COUNCIL
COUNTY ARCHITECT'S DEPARTMENT

Applications are invited for appointments on the Architectural staff. Applicants should state age, qualifications and experience, and salary required.

Particulars should be submitted, with the names of persons to whom reference may be made, to the County Architect, County Hall, Chichester, to reach him as soon as possible.

A scale of contributions in connection with lodging allowances and removal expenses, incurred by newly appointed staff, has been adopted by the County Council.

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

County Hall,
Chichester. 1009

COUNTY BOROUGH OF WIGAN
BOROUGH ENGINEER AND SURVEYOR'S DEPARTMENT

Applications are invited for the appointment of PRINCIPAL ARCHITECTURAL ASSISTANT, on the established staff of the Borough Engineer and Surveyor, at a salary in accordance with Grade A.P.T. IV/V (£1,140—£1,480).

There is an interesting and varied programme of work in the Department.

Housing accommodation can be offered if necessary.

The point of entry to the salary Grade will be determined by qualifications and experience.

Applications, giving name, address, age, present appointment and salary, previous appointments, and also the names of two persons to whom reference may be made, should be sent to the Borough Engineer and Surveyor, Municipal Buildings, Wigan, to be received by him not later than 20th November, 1961.

ALLAN ROYLE,
Town Clerk.

Municipal Buildings,
Wigan. S1036

LANCASHIRE COUNTY COUNCIL

Applications are invited from persons who have passed the Intermediate examination of the R.I.B.A. for appointments of ARCHITECTURAL ASSISTANTS, A.P.T. Grade II (£815—£960) in the Architectural Section of the Planning Department at Preston.

This section is commencing an interesting programme of work on central area redevelopment.

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 (O), East Cliff County Offices, Preston, by the 21st November, 1961. 1012

CITY AND COUNTY OF BRISTOL
APPOINTMENT OF SENIOR PLANNING ASSISTANTS AND PLANNING ASSISTANTS

Applications are invited for the following appointments in the City Engineer and Planning Officer's Department. The appointments are required mainly to deal with the Review of the Development Plan and the Replanning of the Central and other large Redevelopment Areas and the Control of Development.

1. SENIOR PLANNING ASSISTANTS, J.N.C. Scale "A," £1,360—£1,565 p.a.

Candidates for these posts should be Members or Associate Members of the Town Planning and/or other appropriate Institute and have had considerable general planning experience in the office of a large Urban Planning Authority, and be competent to supervise qualified staff.

2. PLANNING ASSISTANTS, A.P.T. V, £1,310—£1,480 p.a.

Candidates must be Members or Associate Members of the Town Planning Institute or other appropriate Institute and have had experience in connection with the preparation of a Development Plan or Central Area Redevelopment.

3. GENERAL ASSISTANTS (DEVELOPMENT CONTROL), A.P.T. II—£815—£960 p.a.

Applicants should be appropriately qualified and possess a knowledge of the Control of Development, planning procedure or building practice.

The housing needs of the successful candidates and the question of a contribution towards removal expenses will receive favourable consideration.

Applications should be arranged in the following order: Age, nationality and whether married or single; education; training, professional qualifications; present position with salary and date of appointment; previous positions with salaries and dates of appointment; detailed particulars of experience; any further remarks in support of the application; notice required to terminate present appointment; whether related to a member or senior officer of the Council; names of two persons to whom reference may be made.

Canvassing will be a disqualification.

Applications clearly indicating the post concerned should be delivered to the City Engineer and Planning Officer, Cabot House, Deanery Road, Bristol, 1, by the 20th November, 1961. 1031

HUNTINGDONSHIRE
COUNTY ARCHITECT'S DEPARTMENT

Applications are invited for the following appointments:—

(*a*) QUANTITY SURVEYING ASSISTANT, Grade A.P.T. III, £960—£1,140 per annum.
(*b*) ARCHITECTURAL ASSISTANTS, Grade A.P.T. II, £815—£960 per annum.

Applicants for (*a*) must be experienced in the preparation of bills of quantities, interim valuations and settlement of final accounts, and should be studying for professional qualifications.

Applicants for (*b*) must have had several years drawing office experience and should be studying for, or should have passed, the Intermediate R.I.B.A. examination.

Further details and application forms may be obtained from the Deputy County Architect, County Buildings, Huntingdon, and completed forms should be returned to the undersigned by Monday, 27th November, 1961.

A. C. AYLWARD.
Clerk of the County Council.

County Buildings,
Huntingdon. 1032

CORNWALL COUNTY COUNCIL

Applications are invited from experienced CARTOGRAPHICAL DRAUGHTSMEN for a post in the Headquarters Office of the County Planning Department at a commencing salary of between £555 and £685 per annum according to qualifications and experience.

Assistance towards removal expenses will be given.

A five-day week is in operation.

Applications, stating age, qualifications and experience, together with the names of two referees, should be sent to H. W. J. Heck, PP.T.P.I., County Hall, Truro, not later than 22nd November, 1961.

E. T. VERGER,
Clerk of the County Council. 1033

RENFREW COUNTY COUNCIL

The Council have vacancies for (*a*) ASSISTANT ARCHITECT (£1,105—£1,350); (*b*) ARCHITECTURAL ASSISTANT (£715—£1,055 depending on experience). Applicants for post (*a*) should be qualified. Superannuable posts. Applications stating age, qualifications, etc., and naming two referees to County Clerk, P.O. Box 12, Paisley, immediately. 1018

COUNTY BOROUGH OF BLACKPOOL
Proposed Redevelopment Queenstown Clearance Area and Part of Laycock Gate Industrial Area Comprising 4.88 Acres.

Contractors are invited who have the facilities and would be prepared to enter into a Package Deal form of contract for the development of the above site with high density flats and maisonettes to submit their names for consideration.

The contract would include architectural and specialist services, site layout, roads, sewers and development of the site with multi-storey and three and four storey flats and maisonettes.

Further particulars may be obtained from the Borough Surveyor, Box No. 17, Municipal Buildings, Blackpool. 1034

BOROUGH OF PORT TALBOT
APPOINTMENT OF SENIOR TOWN PLANNING AND DEVELOPMENT ASSISTANT
(A.P.T. IV, £1,140—£1,310 per annum)

Applications are invited for the position in the Borough Engineer and Surveyor's Department from persons who are Associate Members of the Town Planning Institute or who hold an equivalent qualification, and who have had experience in the office of a Local Planning Authority. Experience of Central Area Development would be an advantage.

The successful applicant will be required to take charge of the Town Planning Section of the Department, which is responsible in addition for Byelaw and Improvement Grant Applications.

Consideration will be given to the provision of house accommodation, if required.

Applications, stating age, present position and salary, previous positions, qualifications and full details of experience, together with the names and addresses of two referees, to be received by me not later than Friday, the 17th November, 1961.

W. KING DAVIES,
Town Clerk.

Municipal Buildings,
Aberavon,
Port Talbot.
1st November, 1961. 1057

Tenders Invited

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

BOROUGH OF WORKSOP

Proposed thermal re-insulation and weatherproofing of the roof slabs of the Public Library and Museum, Memorial Avenue, Worksop.

Tenders are invited from *bona fide* contractors for the execution of works comprising the removal and disposal of existing thermal insulating and weatherproofing materials from the roof slabs of the Public Library and Museum, and their replacement by new materials.

Copies of a plan, conditions of contract, specification and bill of quantities may be obtained from the Borough Engineer, Park House, Worksop, upon payment of a deposit of £5 5s. 0d., which will be refunded upon the receipt of a tender and the safe return of all documents supplied.

Tenders, in sealed envelopes endorsed "Thermal Insulation" must reach the undersigned not later than 10 a.m. on Friday, the 17th November, 1961.

The lowest or any tender will not necessarily be accepted.

RUSSELL C. PHARAOH,
Town Clerk.

Town Hall,
Worksop.
30th October, 1961. 1044

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 RVOH/518/AJ. 9647

Architectural Appointments Vacant

3s. per line; minimum 12s. Box Number, including forwarding replies, 2s. extra

£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.

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. TC8986

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

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

£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 TC6106

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

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 5396. TC9379

EXPERIENCED ARCHITECTURAL ASSISTANTS and DRAUGHTSMEN

Required for heavy programme of building development.

Good working conditions in pleasant surroundings. 5-day week. Progressive salaries commensurate with age and ability. Continuous employment. Pension scheme. Staff canteen.

Interviews to suit applicants.

Write :—

District Architect,
F. W. WOOLWORTH and CO., LIMITED
1264/1266 London Road, Norbury,
London, S.W.16

PA Personnel Administration Ltd.
MANAGEMENT CONSULTANTS

SENIOR ARCHITECT

London Area

The Chief Architect of a large industrial group is responsible to the Group Chairman for a comprehensive service to some twenty constituent companies. To fulfil a £1,000,000 budget, he seeks the services of a qualified architect who will join his team in a senior capacity. The appointment involves full responsibility for all stages of specific projects and for the control of staff on them.

An associate member of the R.I.B.A. with a minimum of five years' post qualifying experience is required. Some, but not necessarily all, of this experience must have been in the industrial field. The initial salary will be geared to meet the needs of the right man, who may already be earning up to £2,000. Pension Scheme. (Ref.: W8/724/AJ.)

The identities of candidates will not be revealed to our clients without prior permission. Applicants should forward brief details, quoting the reference number, to:—

Personnel Administration Limited
Appointments Division,
2, Albert Gate, London, S.W.1.

Regional Offices: GLASGOW • MANCHESTER
BRISTOL • BIRMINGHAM
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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.

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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.

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Fairbrother Hall & Hedges, Edinburgh, require architects and architectural assistants for interesting work. Current projects include secondary and primary schools, industrial laboratories, factories, local authority housing and flats.
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INTERMEDIATE-FINAL standard or qualified ASSISTANT required in small office. Salary £600—£1,000 according to experience. Apply Michael V. H. Watkins, A.R.I.B.A., 28, Walter Road, Swansea. S9797

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ARCHITECTURAL ASSISTANT required to carry out design work on large projects. Salary £1,000—£1,200 according to ability. Write giving details of design training and experience to: W. H. Rogers, 15, Mark Lane, E.C.3. 9830

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TRIPE & WAKEHAM, Chartered Architects, require an ASSISTANT with 3—5 years' office experience, to work in their London office. Salary by arrangement. Telephone: WELbeck 7744 or write to 16, Fitzhardinge Street, London, W.1., for an appointment. S9848

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Architect required for The Architects' Journal editorial staff. Must be intensely interested in building costs and techniques and the preparation of technical information. Please write giving details of experience, age and salary required to the Editor, The Architects' Journal, 9-13 Queen Anne's Gate, London SW1.

SENIOR ASSISTANT ARCHITECT required in Architects Department of a large Midlands Brewery Company.

Applicants must be Associates of the R.I.B.A. and must be competent designers and draughtsmen, previous experience of licensed property work is not essential. Applicant's age not to exceed 45.

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ARCHITECTURAL ASSISTANTS. Intermediate standard—for the Architect's Department of a large Property Company. Salary by arrangement. L.Vs. Apply: Hubert L. Meed, A.R.I.B.A., Artizans Group of Companies, 160, Brompton Road, S.W.3. S9888

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LAGOS Office of W. H. Watkins, Gray & Partners requires SENIOR ASSISTANT for responsible position. Varied and interesting work. Write giving full particulars of qualifications and experience to W. H. Watkins, Gray & Partners, 57, Catherine Place, London, S.W.1. TC9970

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Telephone: CHAncery 4725 or write. TC1040

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STEEL, PEECH & TOZER, a branch of the United Steel Companies, Limited, have vacancies for ARCHITECTURAL ASSISTANTS with at least five years' practical experience. Variable type of work including office blocks, amenity centres and service buildings. Industrial experience would be an advantage but is not essential. Good working conditions, 38 hour week and excellent superannuation scheme. Salary according to experience and qualifications. Applications should be made in writing to the Labour Manager, Steel, Peech & Tozer, The Ickles, Rotherham. 1049

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MONTREAL, CANADA. Young ASSISTANT ARCHITECTS required for a small expanding office. Intermediate or Final standard with a minimum of one year's office experience. A knowledge of French would be an asset but is not essential. Commencing salary $4680.00 p.a. Reply, airmail, stating age, education and experience to: Charles E. Charbonneau, Architect, 1551, Montarville St., St. Bruno, Co. Chambly, P.Q. Canada. 1043

WATNEYS

ARCHITECTURAL ASSISTANT (Intermediate standard) required in Brewery Architect & Surveyors Dept. for work in connection with industrial and administrative buildings.

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Brewery Architect & Surveyor,
Watney Combe Reid & Co. Ltd.,
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£950-£1,350 MIDLANDS for West Bromwich and Wolverhampton offices—two qualified or near qualified ASSISTANTS with some experience to work on good spec. housing, luxury flats, central area development, office blocks, in small design groups. To be able and responsible from client's brief to final account. All partners and staff under 30. John F. Phillips & Associates, 36, New Street, West Bromwich. Tel.: 2315-6 S1026

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A VACANCY exists for a SENIOR ASSISTANT in the office of Brunton, Baden Hellard and Boobyer, to eventually lead a design team under a Partner's overall control.

1. Professional qualification is necessary.
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The job will involve design, working drawings and site supervision of projects worth over £50,000, and the applicant will eventually be expected to run a job from taking Client's instructions to authorising the Final Account. When carrying out this work satisfactorily, he will be considered for Associate Partnership.

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Applicant will be expected to supervise team of assistants and to encourage delegation of suitable responsibilities to those within the team.

The office is in S.E.12 and help will be given in respect of local accommodation, if required. Write with details of background, or telephone LEE 0228. 1027

ARCHITECTURAL ASSISTANT, Intermediate standard, required in Architect's Department of S.W. London Brewery Company. Must be good draughtsman. Superannuation Scheme. Write stating age, qualifications (if any), experience, salary required. Box S9996.

NEWLY Qualified or Final standard R.I.B.A. ASSISTANT ARCHITECTS required. Busy West End office. Five-day week. Superannuation. Varied and interesting projects. Salary range £90.—£1,500. Write, giving particulars of age, qualifications, experience, etc., to Box S9961.

ARCHITECTS ASSISTANTS required for several client companies in London and Home Counties. Must be U.K. born and have three years' experience. No fees. Business Vacancies Bureau Ltd., 32, Victoria Street, S.W.1. ABB 7200. 9994

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OPPORTUNITIES for working in direct contact with many varying projects including multi-storey housing development, major hospital programmes, banks, shopping precincts, hotels, etc. Responsible positions for first class ASSISTANTS. Write or 'phone R. Mountford Pigott and Partners, 3, Cromwell Place, S.W.7. KENsington 1242. S1065

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3s. per line; minimum 12s. Box Number, including forwarding replies, 2s. extra.

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Do not require to start for one month and can wait longer if prospects suit. References supplied. Please reply: Brian T. Sharp, 33, Gibson's Road, Heaton Moor, Stockport, Cheshire. TC9640

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IN connection with the complete rebuilding of an 820 bed teaching hospital and its ancillary buildings the Governors wish to appoint a Clerk of Works for the first stage of the work, approximate cost £2½ million, of a total scheme with a cost exceeding £10 million.

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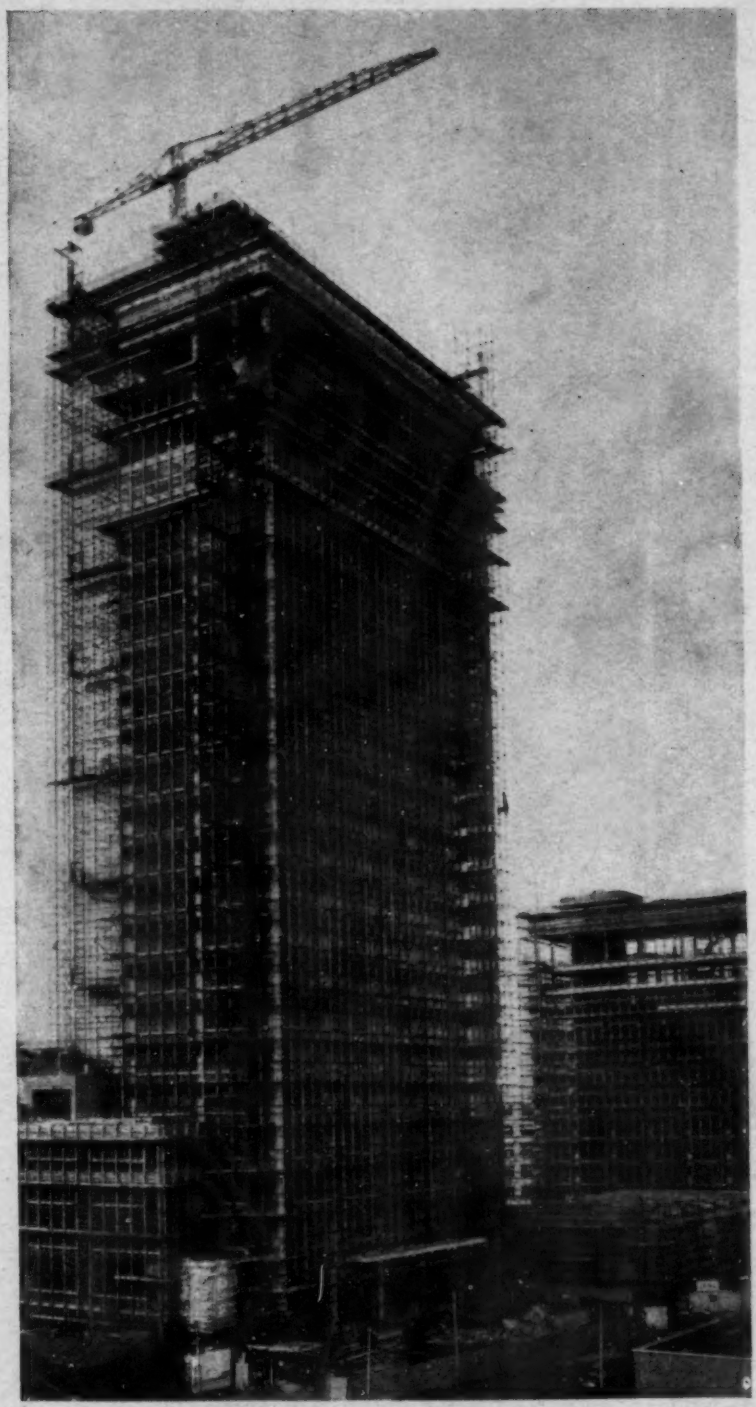

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