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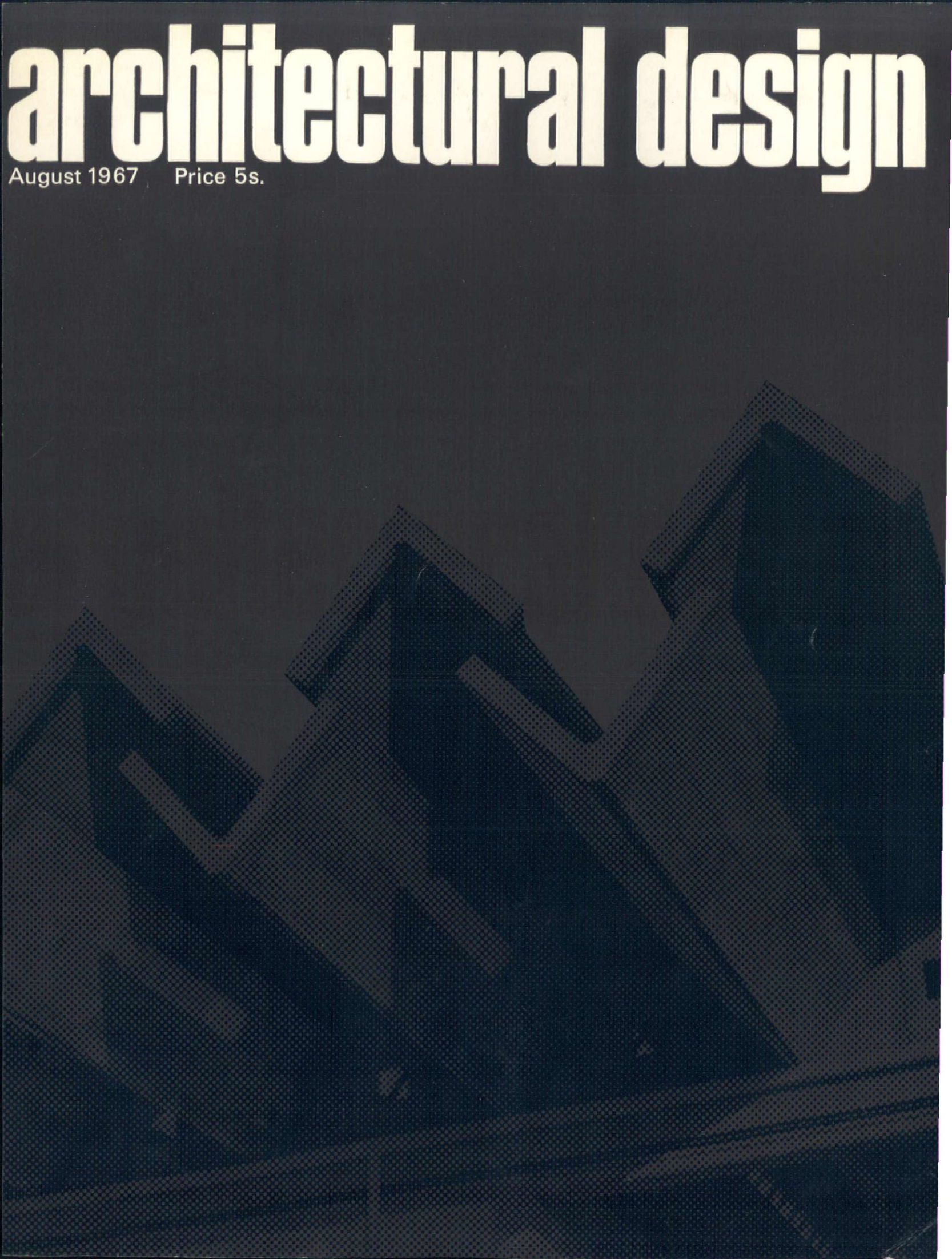

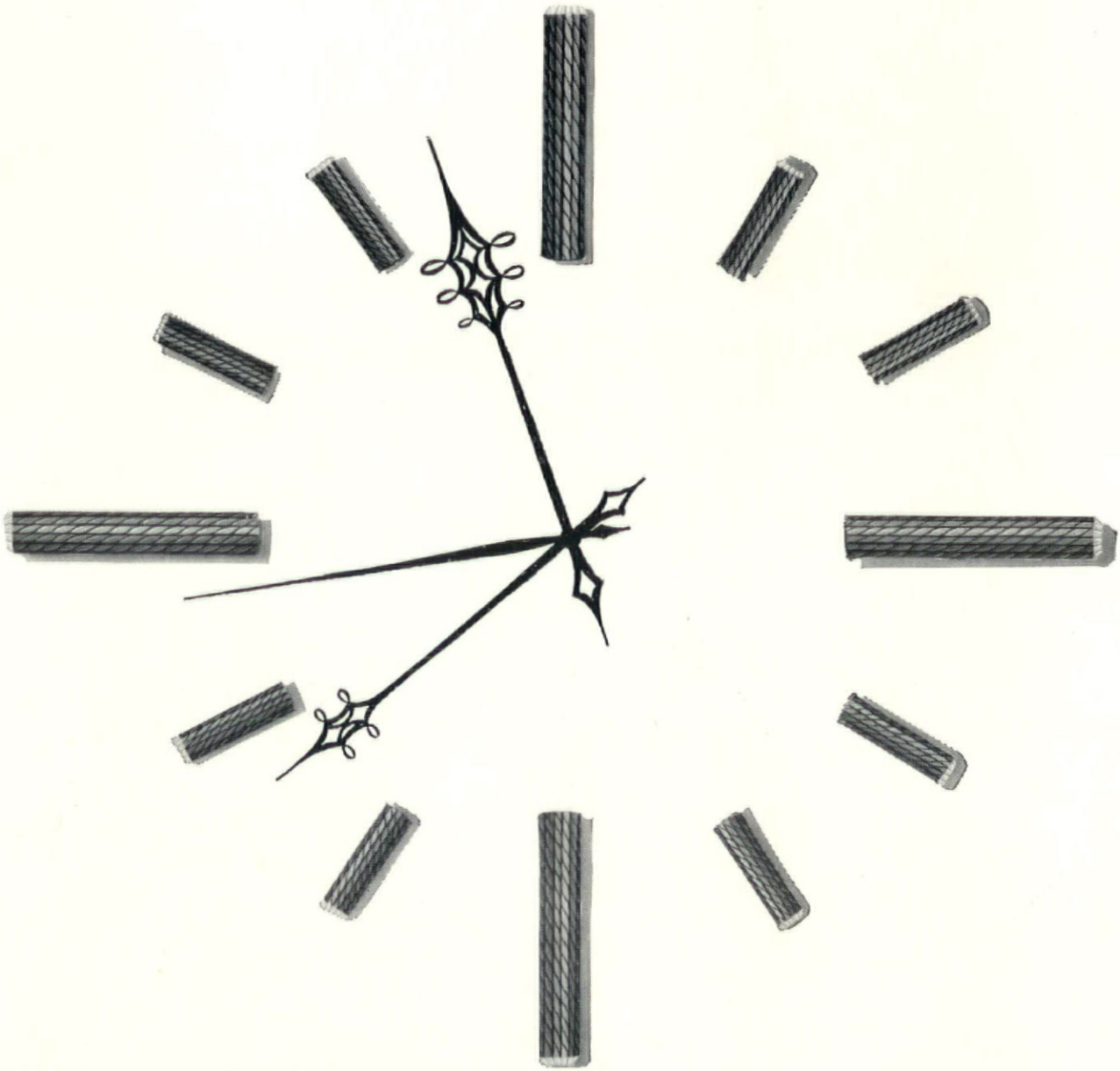

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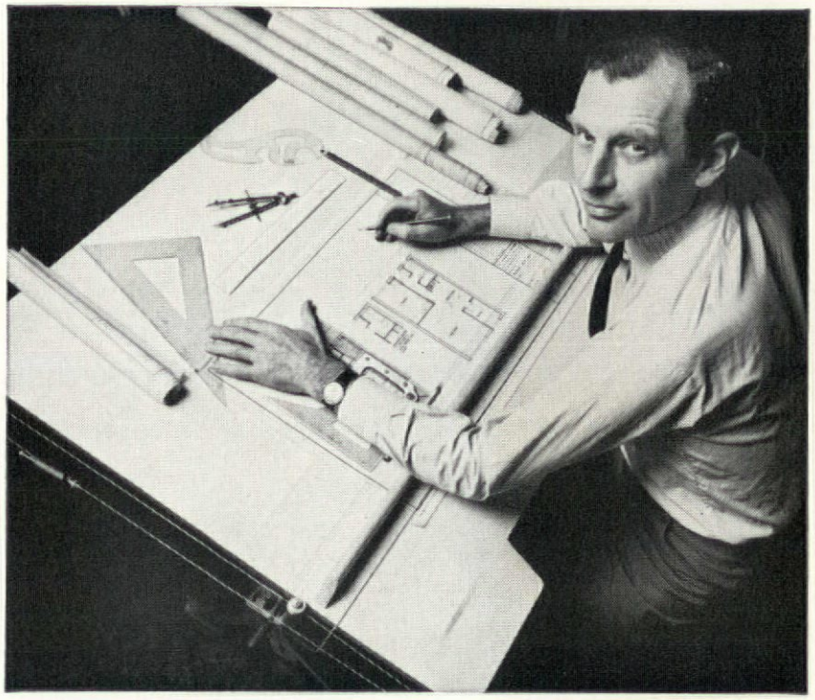

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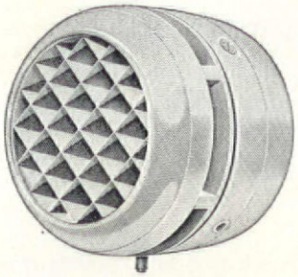

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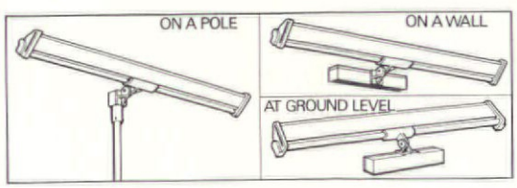

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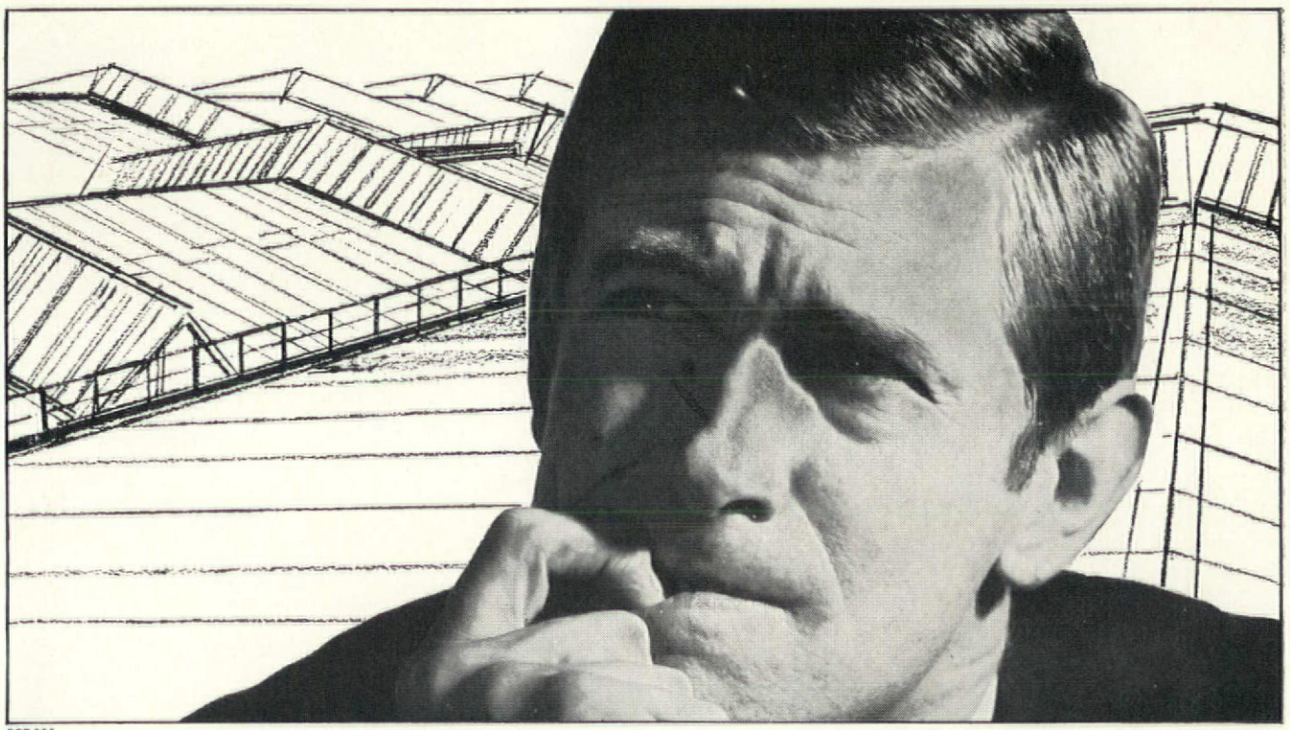

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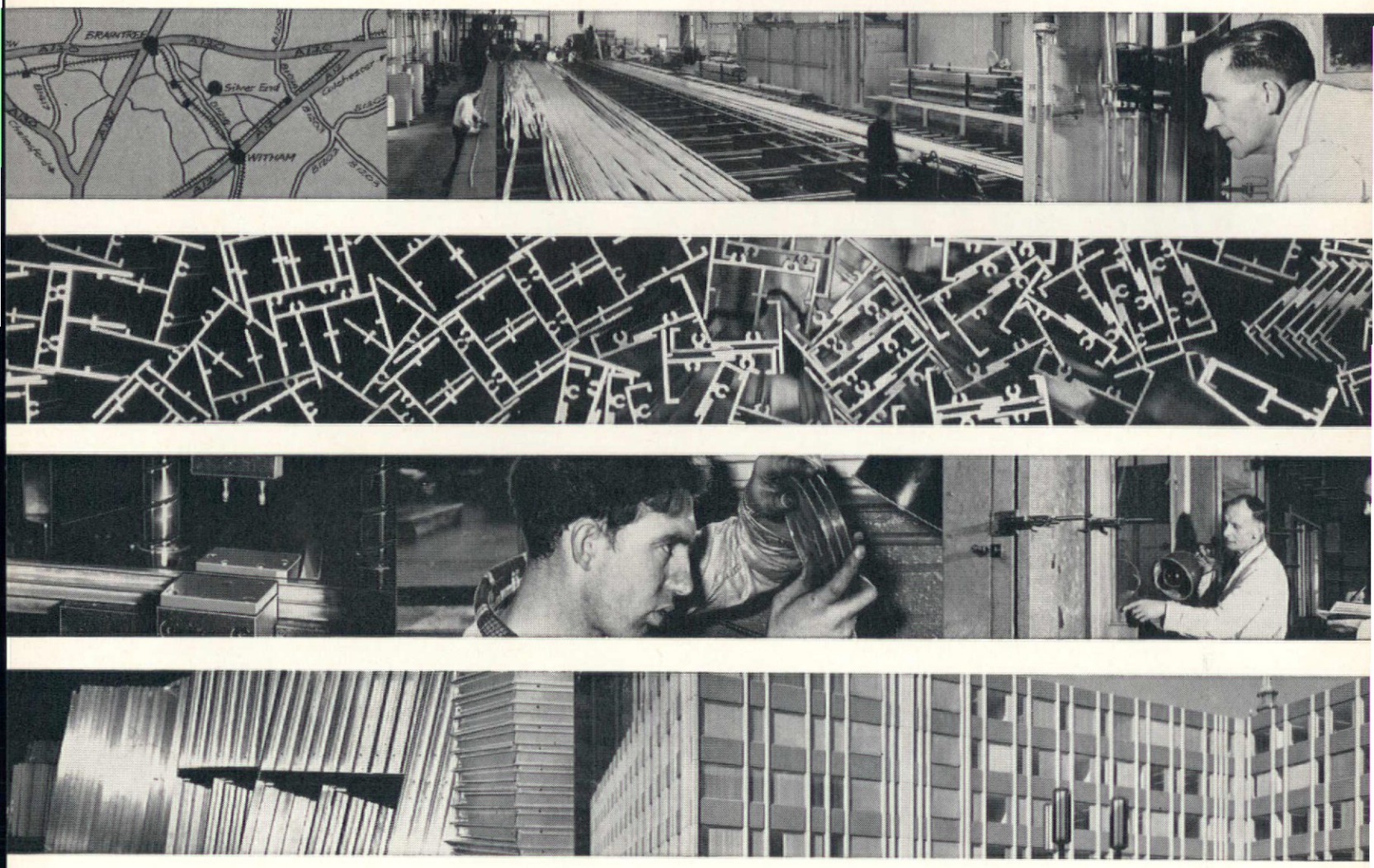

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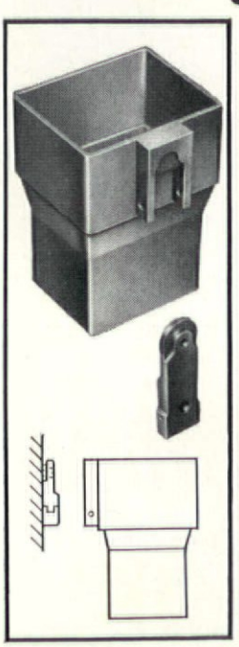

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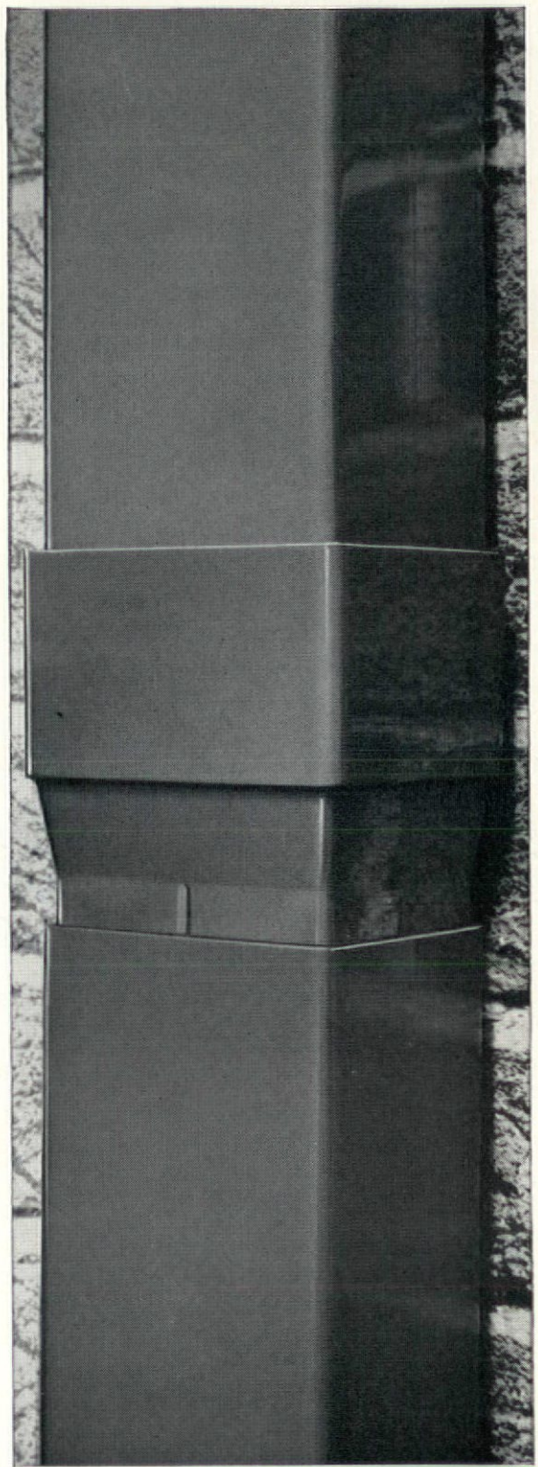

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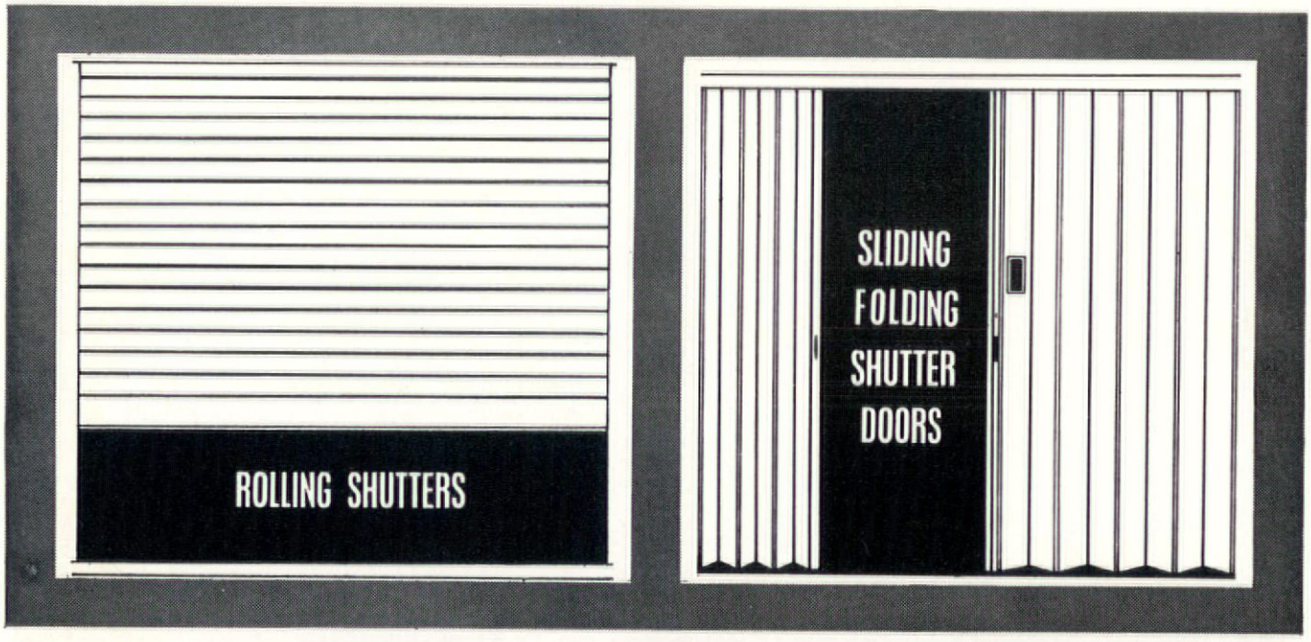
thinking of closing an opening?

BARBOUR INDEX FILE No. 398



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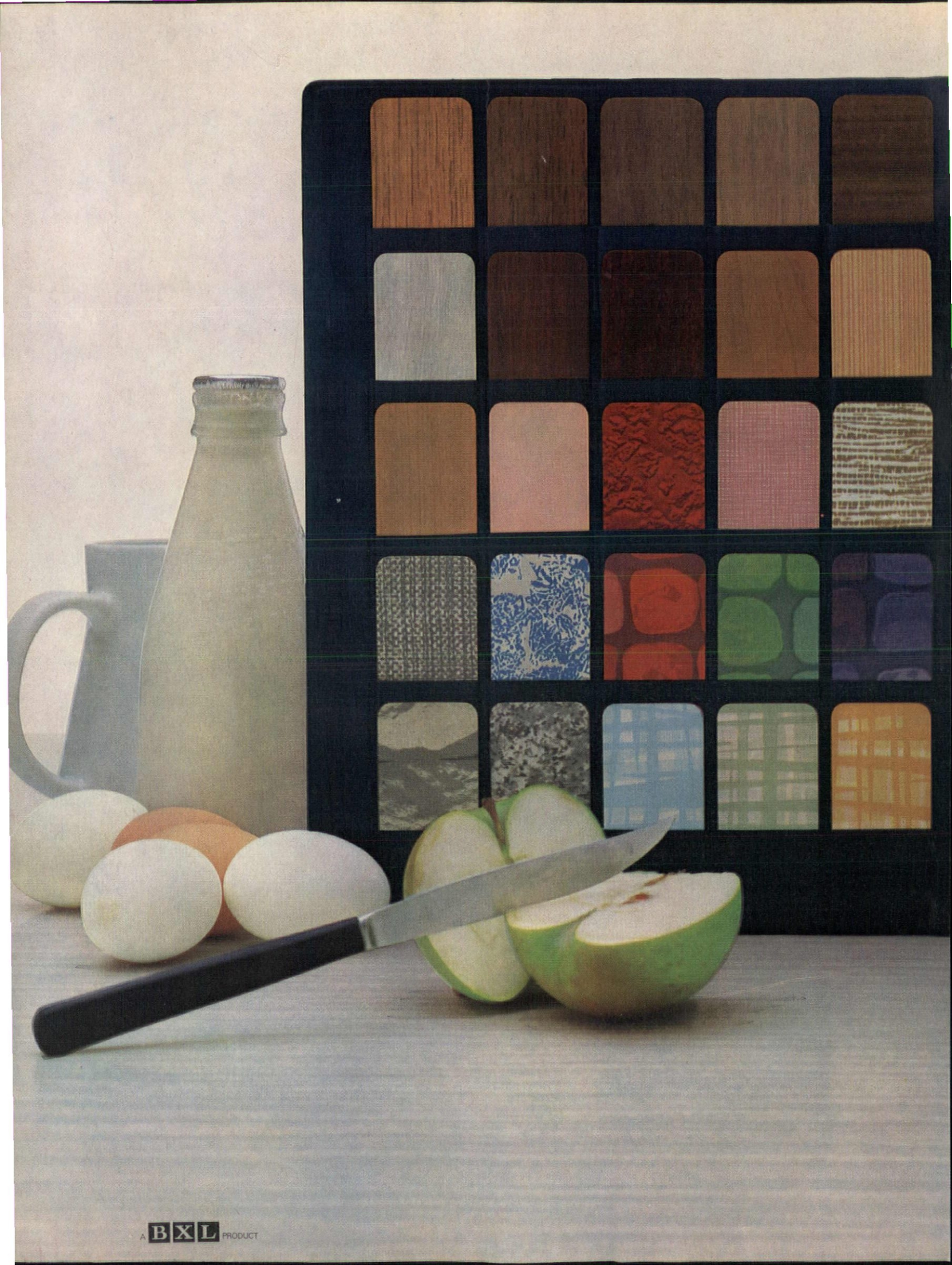
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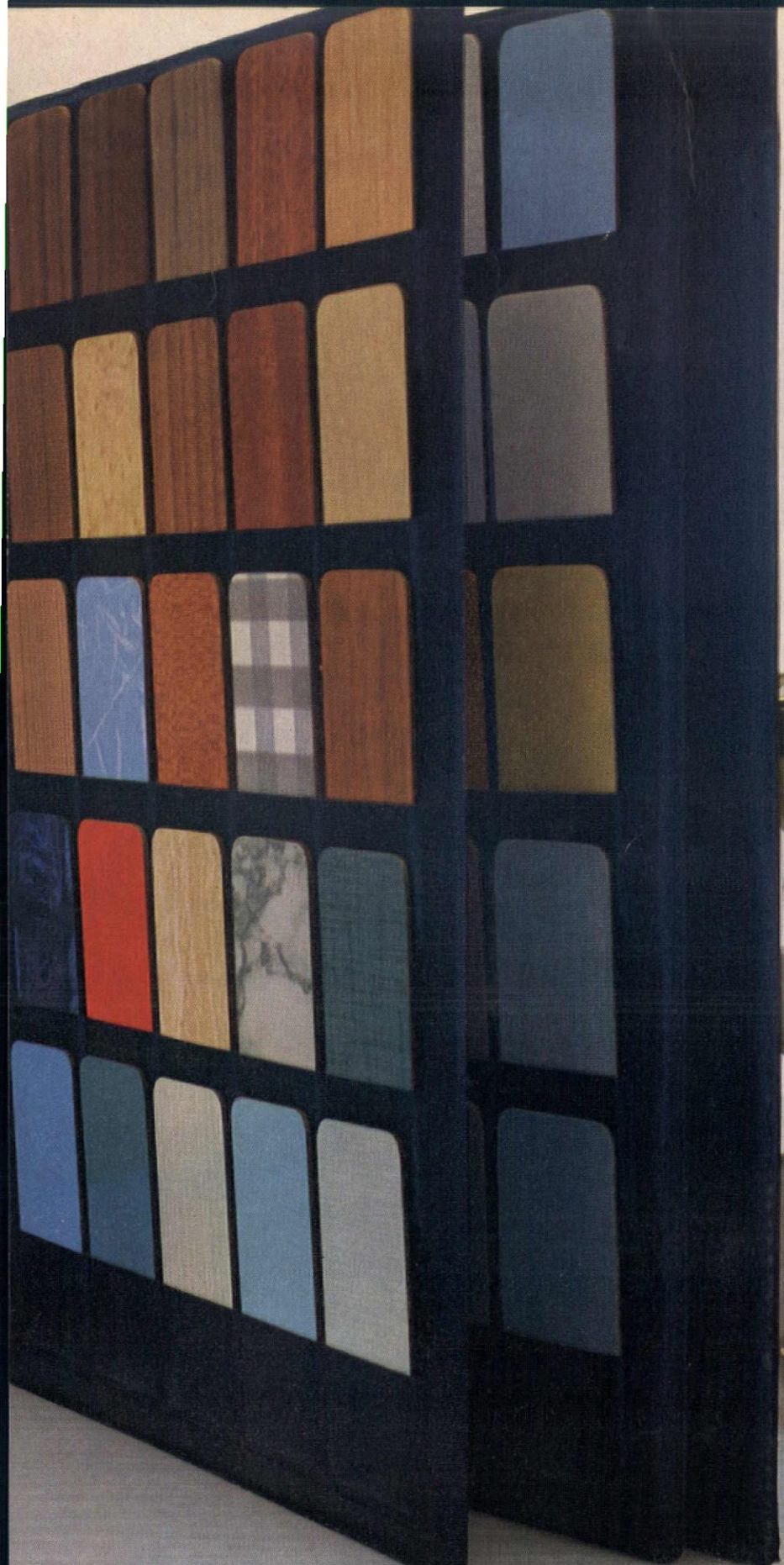

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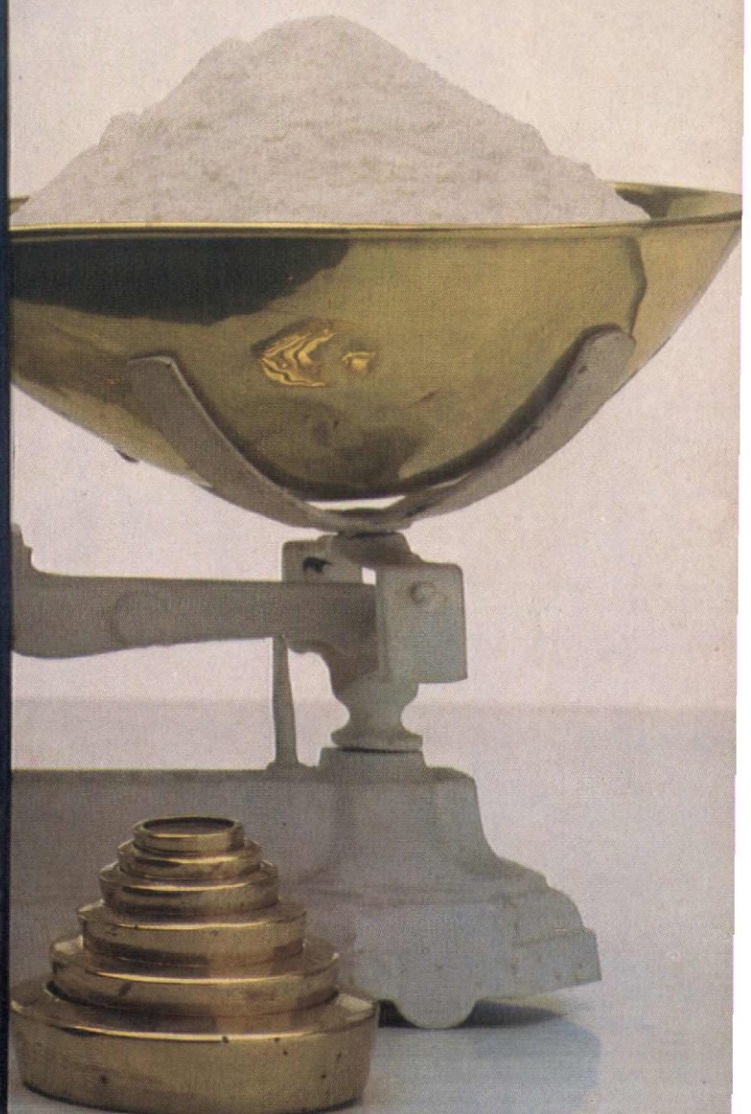

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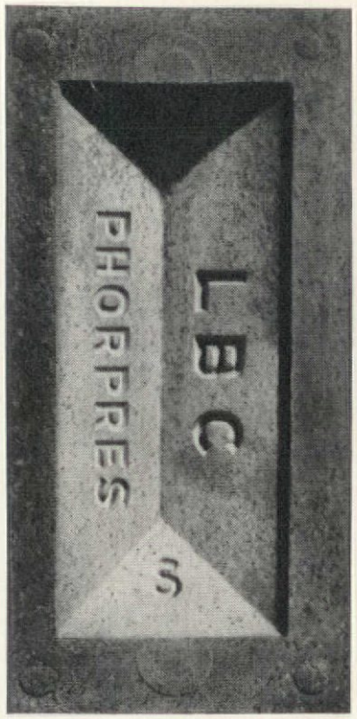

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Month in Britain

Michael Manser

The RIBA Conference at Brighton was one of the liveliest and best attended ever, its theme 'Housing' causing over 500 delegates to immure themselves in the Metropole despite heatwave and sea beckoning outside. The papers covered all aspects of the subject; only one flaw: the simultaneous presentation of three of the most provocative of them.

A World Design Science Decade (Phase 2) exhibition and 'think-in' were held in, respectively, Bloomsbury Square and the London School of Economics (see page 350), presided over by Buckminster Fuller.

The Junior Liaison Organization announced their conference for September at the University of Birmingham with theme subject of 'Value for Money'. World Town Planning Day is scheduled for November 8th this year, and the International Noise Abatement Exhibition is to be in Battersea Park in May 1968. Commissions for architects from the private sector increased but not from the public side. And the East Midlands Region of the RIBA was born. Canada celebrated its centenary with fireworks in Hyde Park.

Watney the renowned Brewers perpetrated a portable plastics pub. Unfortunately it is due to be shipped throughout the world to promote exports at Board of Trade Exhibitions. Described as 'elegant, Victorian-styled' the only hope is it will melt in the tropics before proving to all the world that we do not know how to use plastics.

The Royal Society of Arts gave its bicentenary medal to Harold Glover of the Ministry of Public Building and Works; the Building Centre Trust started looking for a research fellow to work at BRS on a pilot series of building detail sheets; the Minister of Housing and Local Government re-opened the inquiry into the siting of a hover port at Pegwell Bay; the Government found that the Stansted corpse would not lie down, and Sir Hugh Wilson and Lewis Womersley announced a linear plan for Irvine New Town.

Alex Gordon received two awards from the RIBA for buildings in Wales, and general approbation for his Concrete Society training centre at Wexham Springs. Thermalite Ytong Limited announced Thomas Slimie winner of their competition to find Britain's 'perfect family house', but it was not perfect; the AA and the Office for Scientific and Technical Information appointed a Research Fellow to study means of assessing the information needs of architects, and the Minister of Local Government simplified planning appeal procedure, gave the go-ahead to the Lion Yard development at Cambridge together with 162 other redevelopment schemes, recommended that Local Authorities should only make loans on new houses built by registered builders, and announced that the North Sea gas line would come ashore at Bacton in Norfolk.

London Bridge was offered for sale; sonic booms were demonstrated in various parts of the country; fresh cracks were discovered in the stonework of York Minster; and it was reported from America that Ferro Corporation can, with the aid of sunlight, build an instant plastic roof. Loose fabric is sewn to the desired shape and inflated by large fans. Within two days ultra-violet rays do the rest. It is those two days, and the rays, that would be the problem in Britain.

Correction

AD 7, page 324. The Atwater Colonnade, Montreal, shown in section, was not designed by the architects Menkes & Webb but by the architect Harold Ship.

9th UIA Congress in Prague

Walter Bor

In July, about 2000 architects from all over the world assembled in Prague for the 9th UIA Congress. Attendance might have been larger still had it not been for the recent events in the Middle East.

The Congress was preceded, as usual, by the Assembly. Clearly, all was not well with the organization of the UIA which had outgrown itself and was now facing problems arising from its very success. The Executive Committee and the Working Commissions came in for some criticism. The Scandinavian section, with strong UK support, successfully pressed for the setting up of a working group which would report on the necessary steps for an effective reform of the organization. It was also decided that the Assembly and Congress meet only every three years instead of every two as at present (1970 in Buenos Aires), and that discrimination against women architects should cease.

From the ceremonial opening in the famous historic Vladislav Hall with its exquisitely flamboyant gothic vaulting, up to the winding up of the Congress, all went well except for the translations which were rather poor and marred the proceedings. The meetings of the various Working Groups were well attended in spite of the glorious weather; and the Open Forum venues, an innovation, were a success—particularly when such world celebrities as Buckminster Fuller spoke.

The full extent of the work of the Commissions and Working Groups will of course only be known when their work is published, but it is fair to say that a good many valuable contributions were made by individuals, as well as by national sections.

However, Working Sessions, speeches and resolutions apart, this Congress has once again proved its real worth in the human contacts it promoted between architects from all parts of the globe. Our Czecho-slovak hosts are to be congratulated not only on the excellent organization and most generous hospitality (each reception turned out to be a feast and bacchanal), but on the most effective and beautiful staging of the conference in Prague itself. There could hardly have been a more appropriate setting for a Conference on 'Man and Environment' than this unique city with its breathtaking townscape, baroque gardens and magnificent halls. And most appropriately too, individual houses and whole streets were being rehabilitated throughout the historic core of Prague. In a few years' time much of historic Prague will thus be restored to its former glory and it will not require another Congress to attract to it architects from all over the world.

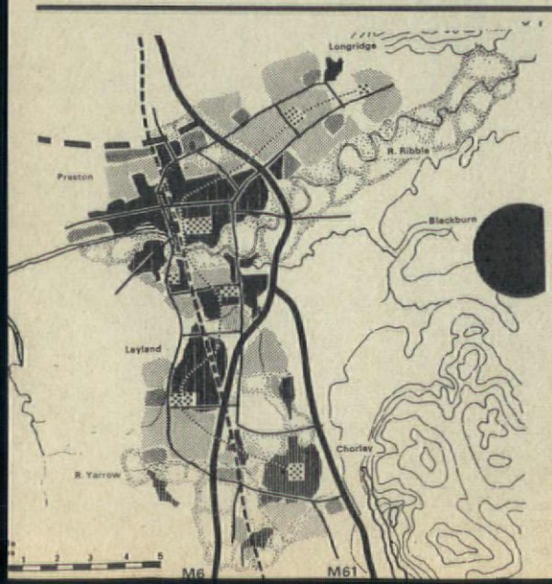
Cars for cities

Brian Richards

A large part of the *Cars for Cities* report (H.M. Stationery, Office, £1 1s. 0d.) is concerned indirectly with the dilemma of probably every family by the year 2000 who, owning at least one saloon car, will find road space totally inadequate for many of the trips it wants to make in congested areas. Already in Britain, one in eight families owns two cars, and the report stresses the advantages of that second car being of minimum size, so that, given segregated roads for them to run on, twice as many people can drive on narrower roads than at present, and three times as many vehicles park. This is an interesting idea. But the report admits that people today prefer a full-size car to a mini and it is hard to see how, without road pricing, there will be any incentive for the mini to become widely acceptable.

The reference to the effectiveness of the segregated cycle tracks at Stevenage is encouraging. No New Town should be without them. And were such tracks available as well for slow, preferably electric, mini cars, rented cheaply to each household, it would be useful to know the consumer response, and whether such giant free-flow intersections as at Cumbernauld are really so essential. But the proposals for London, of an elevated mini-road system are unfortunate, many of the roads apparently discharging the vehicles into possible environmental areas only increasing the chaos and multiplying the danger to the pedestrian.

Little serious consideration is given to the practicalities of short-term car hire. One reason given 'that people will tend to leave things behind', surely damns forever all public transport. Such vehicles could be hired by using credit-cards or tokens as payment and be of considerable use in cities for short, random trips, rather like the Provos proposed using white bicycles in Amsterdam. Looking ahead, the report regards automation of vehicles as being 40 to 50 years away. It may be right, but it makes depressing reading, and some detailed account of the progress being made with the Starrcar system (see *AD*, Nov. 1966) or research by Cornell Aeronautical Laboratory of the Urbmobile would have been useful. Cornell is now being financed by HUD to study the application of the Urbmobile to Buffalo and of particular interest is their concern with perimeter parking silos, permitting 'an autoless core', one in which, like Montreal's EXPO, pedestrian movement is supplemented by a variety of movement systems. Serious thought more along these lines might have made the *Cars for Cities* report a more worthwhile document.



New city for the North West*

The first part of a two-stage study commissioned by the Ministry of Housing and Local Government for a new city in the Preston-Leyland-Chorley area of central Lancashire was published recently.

Robert Matthew, Johnson-Marshall and Partners have advised the Minister to designate under the New Towns Act a total area of approximately 52,000 acres to accommodate a population growth of 250,000 (150,000 overspill plus 100,000 natural increase of new and existing), giving a total population within the proposed designated area of 503,000 by 1991.

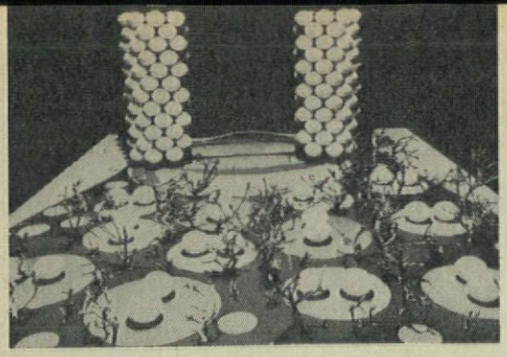
These figures indicate two significant factors in recent trends in new town design. One is that the designation 'new town' is misleading in that this is really a major expansion of large existing towns and their integration into a new city. The other is that the magnitude of this proposal is quite different from the early post-war new towns.

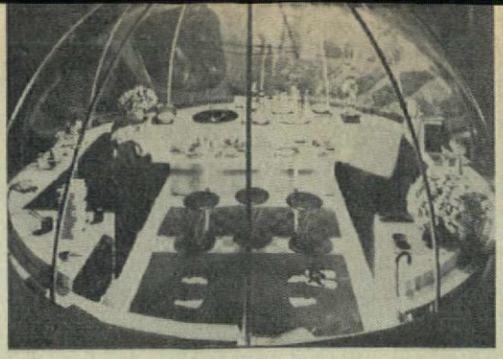
The report includes sections on theoretical urban form and environmental standards. This material deals with the balance of social, economic and transportation factors in determining possible urban structures. These are then related to site development potential and the growth possibilities of existing communities.

The resulting form is a crescent-shaped, linear type of structure with the major city functions dispersed in six townships, Preston being the largest, linked by two high-speed roads and a spine express public transport system.

This is a bold and imaginative project for the north-west which should do much to redress the present national and regional imbalance of growth and prosperity.

* *Central Lancashire, Study for a City.* HMSO. £2 2s.

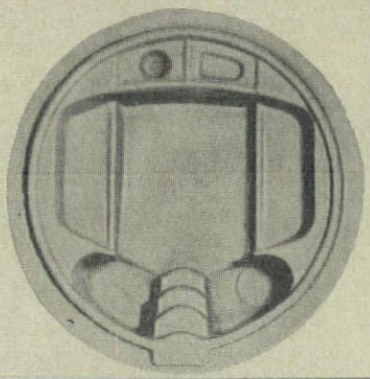


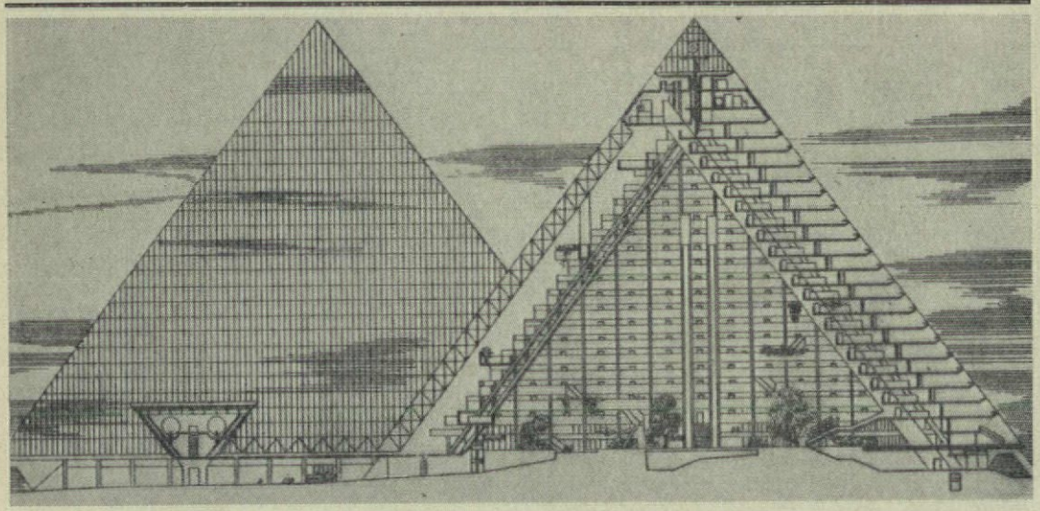


Plastic houses

Brave new mould plastic bubble dwellings are being produced in Mexico by Juan José Diaz Infante N. Basically a one-piece roof/wall shell is fitted to a one-piece floor/furniture base. Many designers would stop there, but Diaz Infante has put his prototypes to the hard test of actual living conditions and filled them with the clutter of everyday life—crockery, telephone, toys, hand bags, magazines, etc., giving the house a cosiness and acceptability for those not yet ready to take up their cushicle and walk.

Calli 25

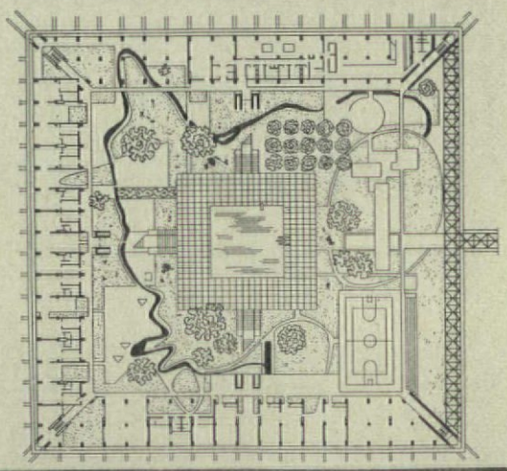




Cold comfort architecture

In 1965 a competition was held for the design of a new neighbourhood unit at Norilsk, one of the best planned of the new northern Russian towns. Conditions in Norilsk are extreme; for over 160 days in the year the temperature and the wind velocity are such that man cannot survive for long out of doors. The new site to be developed lies moreover, on a lake on the wind side of the town. Yet the conditions of the competition stipulated that standard types of housing blocks be used. Not altogether surprisingly some entrants demurred; the most enterprising being a group of Norilsk architects—B. Vaganov, T. Zlatinskaia, J. Trushinsh, A. Shipkow and E. Shterbakov—who were awarded a consolation prize. They designed a continuous 12-storey wall of a building to protect the lower, more conventional structures from the winds off the lake. Standing proud of this wall, overlooking the lake, were clusters of 30-storey pyramid apartments.

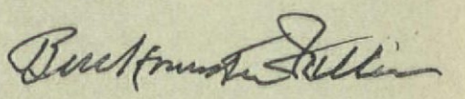
CCCP, 3, 1966



What I am trying to do

In April 1967 the Chairman of the Board of the publication *Who's Who in America* asked some of its biographees to write one-sentence descriptions of their life objectives. He quoted as a classical example from the pages of history one such aphoristic declaration by Henri De Tocqueville which was 152 words long. My submission which follows holds to the 152-word limit without having recourse to the punctuation devices used by De Tocqueville. Herein I show effective self-restraint over my congenital comprehensivist's outpourings which, unchecked, often employ 300-word sentences:

As a conscious means of hopefully competent participation by humanity in its own evolutionary trending while employing only the unique advantages inhering exclusively to the individual who takes and maintains the economic initiative in the face of the formidable physical capital and credit advantages of the massive corporations and political states I seek through comprehensively anticipatory design science and its reduction to physical practice to reform the environment instead of trying to reform man also intent thereby to accomplish prototyped capabilities of doing more with less whereby in turn the wealth-regenerating prospects of such design science augmentations will induce their spontaneous and economically successful production by world-around industrialization's managers all of which chain reaction-provoking events will both permit and induce all humanity to realize full lasting economic and physical success plus enjoyment of all the Earth without one individual interfering with or being advantaged at the expense of another.

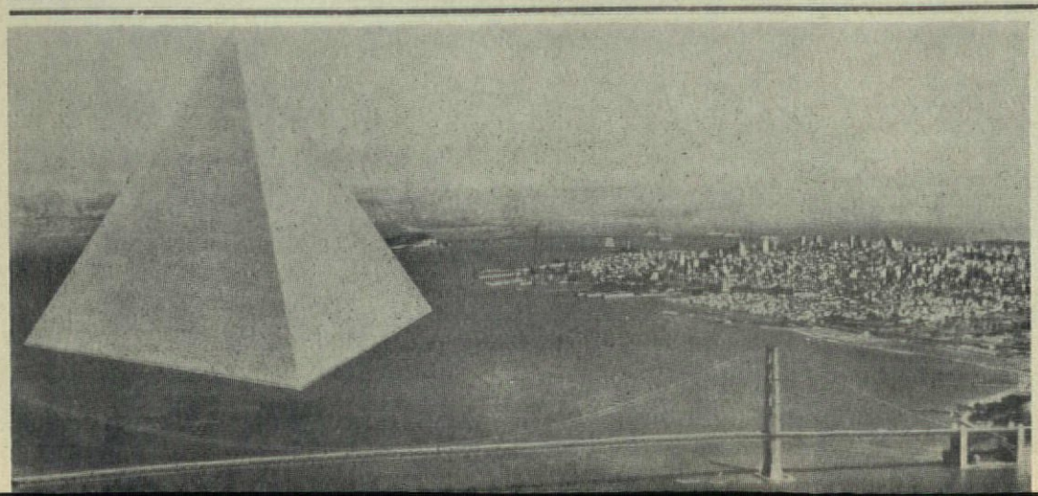


Buckminster Fuller

May 1st 1967

Aboard Spaceship EARTH within the outer reaches of the cosmically spiralling and expanding 'MILKYWAY' (the Galactic Nebula).

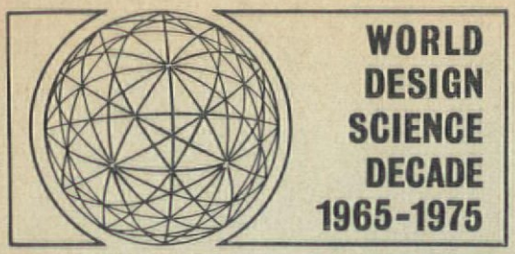
Photograph by Keith Critchlow of R. Buckminster Fuller at the WDSD exhibition, Bloomsbury Square, London, together with Mike Jérome (on the left) and John McHale (right)

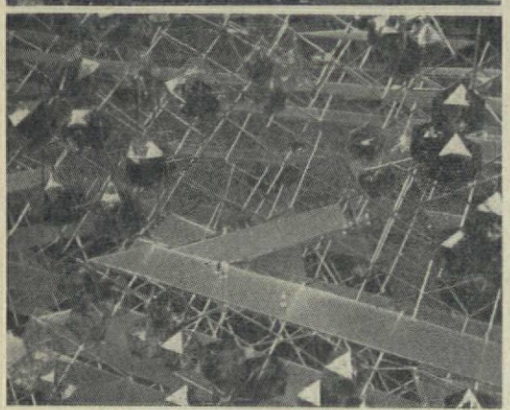


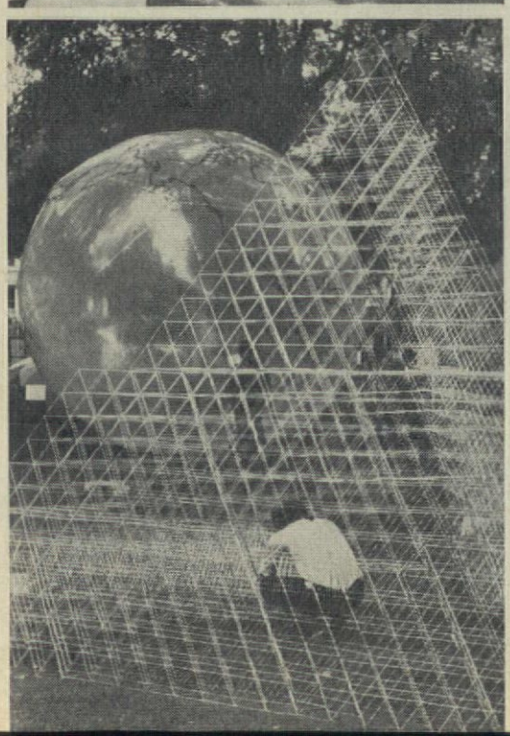
Tetra City

Buckminster Fuller has designed a two-mile high vertical—tetrahedronal—city that can be constructed with all of its 300,000 families each having balconied out-facing apartments of 2000sq ft area. All of the machinery necessary to its operation will be housed inside. Such a floating city would measure two miles to an edge. The depth of its hollow sectional concrete foundations will go below the turbulence level of the sea. They will also constitute landing strips for jet aircraft. Its interior harbour will provide refuge for all vessels. They could be anchored in any position in the ocean, permitting an increase in efficiency of the distribution of the world's raw and finished materials as well as passenger traffic. The total structural and mechanical materials involved in production of a number of such cities are within the feasibility magnitude of the major metals manufacturers.

WDSD Phase II Document 5







Exhibition & Think-in

The exhibition held in Bloomsbury Square, July 10th to 22nd, brought together prototypes, models and display panels showing the work of students and teachers related to WDSD. In some of the projects there was too little demonstration of their relevance as part solutions to world problems; not that one expects to see 'world solutions' as such, but there seemed to be a tendency to assume that the bald fact of a space frame or an inflated polythene dome was sufficient as an end in itself. Professor Fuller pointed out that the windmill by Veronica Hastilow **5**, constructed from the simplest, most readily available materials (cane and polythene sheet) and operating efficiently, was the only structure which embodied the subject of WDSD Phase II, 'The ecological context: Energy and Materials'.

The Think-in opened on July 17th with about 350 followers of WDSD gathered in the London School of Economics. A statement from Professor J. D. Bernal was read out in which new evidence on the origin of life and the tendency for the sciences to converge was noted as affecting thought generally. As we discovered more about the origin of life we could see evolution as a prescribed order of events, or a continuous transfer of molecular information from one organic structure to another, and not as has previously been held, an evolution towards some predetermined master plan. This made old ideals and old religions redundant and at present we continue to pursue old ends by new means.

Professor Fuller disagreed with what he called 'chasing down life'. We should be asking the largest possible questions and *then* seeing what was irrelevant. 'Does man have a function in the universe?' he asked. (Discussion frequently came back to this question.) He defined the difference between mind and brain as the ability to generalize and to make large statements from the sum of individual experiences. This gives us the right to consider our situations as metaphysical or non-entropic. A knot in a piece of rope cannot be described in terms of the physical properties of the rope; it is merely a manifestation of energy impinging on it, in the same way that a wave is a description of energy re-patterning the spatial disposition of water. By analogy, the human being, or any structure for that matter, is an intransient force field continuously collecting and dissipating the constituent elements of the universe. This is an irreversible activity, and 'wealth', which can only control the forward situation and, like knowledge, can therefore only increase. It is the objective of WDSD to find out how to pattern wealth in the wider context.

Professor Thring saw the future in terms of a 'creative society' which was not based on a 'standard of living society'. Our job is to assist in the realization of this, and he foresaw a layered situation where the most intelligent would be permanently engaged on creative activities and the least intelligent on maintenance activities. To these ends his work was involved with creating robots which would do the routine drudgery. (Unfortunately the apparatus for showing a film of his robots was not functioning.)

Cedric Price directed his remarks apologetically towards architects. Do more with less, look at our work in the light of WDSD, and do not look for information to confirm the answers we have already made, but first ask the question and then use our information retrieval apparatus. The difficult operation is making a qualitative assessment of the answer. For instance if you have a teaching system without classes, grades or age groups, etc., how do you determine educational requirements? The population of Kent is rising at the same rate as the population of India. Obviously such a fact invalidates certain notions we have about birth rate. He amplified Fuller's idea of controlling the forward situation, and suggested that the development would be uneven, but the benefits did not necessarily go to the instigator.

Professor Gabor from Imperial College spoke of world food problems and the dangers of slack labour being redeployed in armaments manufacture. Mr Wren Lewis of ICI excused the profits from big business as mere barometers of the usefulness of the product and deplored the lack of a serious attitude towards technology. He urged the need for self-realization and optimism. Dr Sampson from Bristol University on the other hand was profoundly pessimistic. He saw life as a perennial struggle between good and bad, optimism as a soporific and any exertions of the ego a force of evil. Science, no less, is a panacea to avoid the real problems of how to achieve altruism, love and equality. After these showers of sensibility, Mr King of Standard Telecommunications Laboratories presented an analysis of human communication capabilities. A computer works with 'bits' of information and its capacity is determined by the speed with which it can read 'bits'. The human ability to receive and transmit information can be measured in terms of 'bits' and also the total global quantity of transmitted and printed communications. Here for the first time was a contribution toward the WDSD inventory.

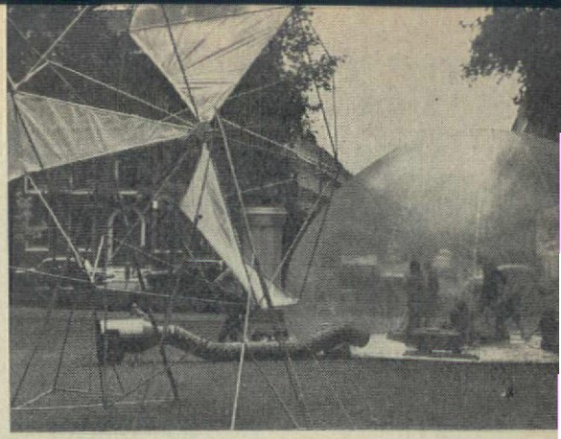
Students in the audience were confused as to the aims of the immediate situation (not that they had ever been specifically stated) and about the meaning of WDSD for their own studies. Perhaps John McHale should have outlined some of his activities in Southern Illinois rather than stating that 'increasingly the themes are global' and then begging the question 'what do we do about it?' and at the same time asking the floor for bright ideas. Few of the 'audience' had read the WDSD documents* and there was little comment or criticism of them, yet there was some demand for a special school or specific curriculum to be set up. McHale was quick to say that WDSD did not exist to replace bad teaching in architectural schools but it was there to help retool the existing educational equipment.

Not till Jonathan Miller joined the platform did the mood of gloomy introspection pass. He questioned the validity of professional monopolies (in medicine for instance a complicated heart operation involves many skills, all equally vital), and pointed out that the enormously increased life span envisaged will overturn the whole structure of society. He was touchingly concerned with the architectural profession.

It became clear that the reason for the students' dissent lay not in the inadequacies of the Think-in or the reluctance of WDSD to commit itself to a curriculum, but in an inability in all of us to recognize that the potential or the way forward is not found in the isolated event or object but comes only from interaction between the situation and ourselves. Professor Fuller, in his closing statement was aware of this. His life-long appreciation of his exact position in the overall pattern has always been his departure point for making the next step. We are all spacemen riding the spacecraft Earth. Our purpose is evident, to maintain and control the progress of our vehicle.

Photos: 1, 3, 4, 5 *Keith Critchlow.* 2 *Sam Lambert*

* There have been six so far, published from World Resources Inventory, a special department set up at the University of Southern Illinois under the direction of John McHale (see AD 7, page 299)



5

Windmill: Veronica Hasilow and Ed Tillotson (Reading) **5**

Exhibition panels: John McHale and World Resources Inventory, 1st year AA students, Mike Ben Eli (AA), George Rigamont (Venezuela)

Shower: Michael Kemp (AA)
FGR Plastic building system: Mickleover transport

Hexagon triwall triple corrugated cardboard emergency house: Keith Critchlow and 1st, 2nd and 3rd year AA students **3**

Cardboard octangular house: Reading University Fine Art students

Tensegrity city and models: Mike Jerome and Bristol School of Architecture students **2**

Geoscope (polythene) showing world population distribution: Hornsey College of Art students **3**

Geoscope (pvc) showing wind and water movements: Farnham College of Art, students and staff **3**

Nova dome: Peter Murray, Mylow air structures **5**

Tetra floating city model (RB Fuller project for Tokyo harbour, see opposite): Farooq Hussaen **4**

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All that glitters is not stainless*

Reyner Banham

Two of the most important resources of modern design are about a hundred and twenty years old now: one is the plastics industry, the other is the tradition of worry about the state of the art. As far as plastics are concerned, celluloid moulding dates from the work of Alexander Parkes in the middle eighteen-fifties, and the vulcanizing of rubber dates from the work of the brilliant American Charles Goodyear, a decade earlier. In the divided culture in which we live and work, we have to remind ourselves who founded plastics, but I don't have to remind you that design-worry was founded by old John Ruskin and young William Morris, not to mention stylish Gottfried Semper in Germany and functional Horatio Greenhough in the USA, in those same middle years of the last century. Yet, if you cast eyes on the visible scene, or lay hands on the tangible environment, you will know that the effect of the plastics industry has been vast and all-pervasive.

But what has the tradition of worry about the state of the art done for design that can be compared to the avalanche of new materials and products that the plastics industry has emptied over the face of the earth? One thing it has done is to worry about new materials like plastics: new materials that drive out old and familiar ones because their performance can be more accurately specified than any ancient craftsman could select wood—can be more accurately specified by the designer; but remain totally inscrutable to the ultimate consumer.

So, John Q. Public, the well-known car buff looks at the badge on the front of the 1967 GT Supremo Saddle-stitched Hodad Fastback, and can't tell by looking whether it is an exquisite specimen of the goldsmith's art sealed under crystal glass, or just crafty vapour-gilding on the back of one shot styrene moulding—though he has his suspicions! Or, another instance: the red Mini-car in which the Banham family used to thread its way deftly through the wild, swinging mini-skirted London scene was protected all round its lower perimeter by a strip of what was implied to be stainless steel, but proved to be metal foil sealed under clear plastic.

It glittered like stainless, but it wasn't. What is more, it did a better job than stainless could have done, by not introducing certain risks of snagging, tearing and spearing that make steel dangerous in an accident. Yet the classic tradition of design-worry would insist on genuine stainless and denounce the plastic trim as a cheap substitute or a trick. To satisfy the conscience of design (a monster on which I shall have much more to say) we have to be impaled by genuine stainless steel.

Fortunately, design-worry offers other precepts to guide us: for instance, that plastic trim would be OK if it didn't pretend to be something that it isn't. But that would deprive us of something that we all clearly love: glitter, high finish and shine. These are visual qualities that plastics have democratized, so that the average parking lot or appliance show-room bounces back the light in a way that previous ages probably saw only on the serf-polished armour at aristocratic jousts and tourneys.

And this love of glitter is not just a vulgar dream of the silly and underprivileged. That greatest generation of design theorists, who flourished from 1910 to 1930, all loved that glitter and taught us to love it too: Frank Lloyd Wright rejoiced in the lights of Chicago by night, Marinetti saw the new age reflected in the light bouncing back from consoles and electrical plants, Gropius called for buildings like crystal symbols and Mies van der Rohe built them, Fernand Leger was struck by the magic of light on metal in a field gun, Le Corbusier and Marcel Breuer put that magic into production on furniture, Sir Herbert Read invited us to admire instruments and vessels of stainless steel.

Industrial design rides upon the back of an industrial complex which exists primarily to satisfy such desires of man as universal glitter. But why does the heart of Man desire it; why did the great masters of modern design teach us to echo, in life, Goethe's dying demand *Mehr Licht!* What is the source of this modern desire that plastics above all can supply?

Philosophers, semanticists, psychologists, historians (and there's a bundle of resources every progressive design office and school increasingly employs) can all shed some light on this; The hypnotic effect of glitter and brightness caught up even St Thomas Aquinas, perhaps because *shining* is a word that rings with virtue throughout Holy Writ. The great source of our preoccupation with the shininess of modern design, is that it symbolizes the fresh start, the clean new way of life that was, and is, to replace the miseries of those dark satanic mills in which industry and its arts of design were born.

The generation of great grey eminences who presided over the birth of modern design as a responsible profession, grew up in the grubby, coarse-textured world of late-Victorian industry. They saw that industry's main product—soot—irremediably caking the unpolished and unwashable surfaces of its main structural materials, brick and cast iron, and they complained, in the words of that great visionary of light, Paul Scheerbart:

Backstein-kultur tut uns nur Leid
brick brings us only hurt.

No wonder Adolf Loos wanted the walls of the heavenly city to be flush and smooth from top to bottom, and that his generation saw the task of design in Augean terms; a total, global clean-up. And not just a physical clean-up—in the writings of Le Corbusier; for instance, words like *health* and *morality* frequently turn up in adjacent phrases of the same sentence as twin attributes of modern design. One of the great intellectual resources of our times, the concept of moral improvement through design, is also one of its most powerful sources of intellectual confusion. I suppose it goes back to that lovable Victorian nut A. W. N. Pugin, and his implied proposition that the revival of truly Christian or pointed architecture would bring back the Age of Faith that he supposed to have been in full swing when pointed or Gothic architecture appeared for the first time round.

Ever since then, design theorists and worriers over the state of the art have insisted that style betrays the moral intention of the designers: Art Nouveau equals decadence, Expressionism equals selfishness, white walls and flat roof equal care for functional performance, redwood and roof overhangs equal care for human values, glass boxes equal inhuman disregard for people; chromium bright-work equals commercial swindle; and so forth.

Not one of these propositions is demonstrably true, yet each has been (and many still are) passionately believed in, or persist as unrevised prejudices. Yet we know that many flat-roofed and white walled modern buildings were indifferently designed for functional performance. Or, again, when General Motors came up with the neat, sweet, almost chrome-free body shell of the first Corvair, moralizing design critics congratulated Detroit on mending its wicked ways. Yet this is the model that Ralph Nader and all the litigants assert is a death trap sold by GM with full knowledge of its instability. It seems that the glitter of a morally sound style does not guarantee a stainless reputation to the product in use.

Moral preoccupation is one of the great driving forces of modern design and could be a great guarantee to the general public; were it not so self-regarding. We constantly resolve to go out and do better by taking the situation more seriously

Better? What's so good about a world where the designers have salved their consciences by taking everything so seriously that poetry falls flat. One of humanity's main motives for surviving the bomb, the baby-boom and the final solidification of the freeway system into a coast to coast parking-lot, will be to get the birds and the poets back into orbit, revive the watusi and the pavane and clip on the optional equipment generally. Humanity is not going to survive just so that designers can work up a high polish on their consciences, nor will it thank them for being less autarchic and more systematic in their thinking if the products don't get any better.

Any person in his right mind will know that conscience divorced from function helps nobody, yet the design profession at large is chronically prone to elevate the demands of private conscience—why? The answer again lies in the sources from which modern design has sprung: the concept of the designer as some kind of artist. On the one hand, this descends from the traditional view of the architect as one who imposes cultural values on the mere construction of buildings; on the other hand, from the William Morris fiction of the designer-craftsman as an artist in the sense in which the nineteenth century understood artists; that is, as a free spirit answerable only to himself. If the public didn't understand the artist's work, so much the worse for the public, especially as they still owed him a living. Morris himself took a more socially responsible view than this, but my reading of many of his professed followers is that they believed that the only good product was one that brought pleasure to its producer. You will hear this proposition usually in the guarded and inverted form that mass-production is evil because it brings no pleasure to the worker, but whichever way you phrase it the whole conception is antisocial and perverse. No more in design than in dentistry can society accept that the first responsibility of its servants is to please themselves. And so to the big cross-up: the public conscience of the design profession tells it that it cannot give absolute allegiance to the promptings of its private conscience. The designer as social being confronts the designer as creative individual in any unresolvable dilemma, and he is glad to have any hell-fire demographer or revivalist cybernetician come and hand him a ready-made answer, to this problem or any of the others.

For the conscience problem is no more than typical, in its inner contradictions, of the situation that modern design has inherited from its historical sources. Whereas most of its physical resources have unequivocal value—new materials, new production methods, etc.—many of its psychological sources bear signs of the confusions and misdirections that have resulted from trying to keep up with the physical resources, and failing.

Take the concept of the basic design course, the *Vorkurs*, or what have you. There is a great primary source if you like it! As a concept it has a noble simplicity to it; the student is to be returned to zero and made to begin again with the elementary materials and primary relationships of his craft. The sophisticated shall be brought low, the honest and humble shall be lifted up.

Yet all over the world, the *Bauhaus system*, as this kind of teaching is often called, is in disarray and contention. Most design educators don't seem to know where else to start, even while admitting that the system doesn't work. What has gone wrong? Firstly, and obviously, it never was a system; it was a body of teaching methods under constant revision from 1919 to 1933 by a body of remarkable men. And it was the men who mattered—the system never went wrong while it was administered by men who had been through the Bauhaus mill. It never went wrong on Josef Albers, for instance.

But the other thing to note is that these old *Bauhauslern* kept the methods under revision: there is startlingly little resemblance between what Moholy-Nagy was doing in his last years at ID in Chicago, and what he and Albers had been doing in Weimar in 1923. And the driving motivation to change everything was, I suspect, that one of the chief justifications of the original Weimar course invented by Hannes Itten had disappeared—it was no longer necessary to disabuse students of ingrained visual prejudices, and is even less necessary today.

A lot of things have happened to people since the Bauhaus was young, things like junk sculpture, hand-held movies, Batman, action painting, the Hell's Angels, surrealism, custom car shows, Op art, Henry Moore, Cinerama, and like that. And, as a result, people have become sophisticated—remarkably so—and far less visually prejudiced: Beady little eyes that can tell stainless from spray chrome at fifty paces, and prefer the latter because it is more joky, clearly need a very different type of education to what suited the mystical peasants who crawled out of the Biedermeyer woodwork to join Gropius at Weimar.

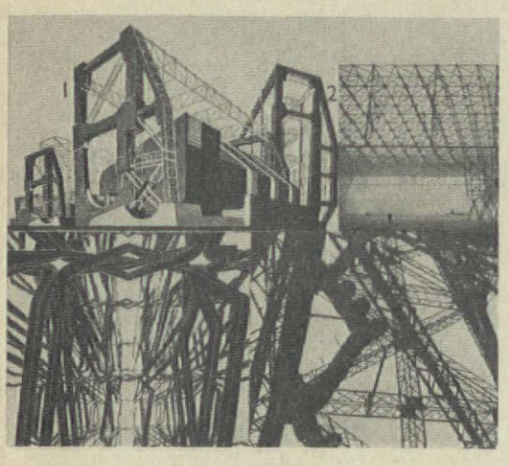
Something else that has happened to people since the Bauhaus is, of course, the Bauhaus—and industrial design generally. It has not gone unnoticed, either; the public has picked up some famous names and even a few fairly far-out tastes.

After a hundred years or more of regarding the bad taste of the public as one of design's major problems, it can be difficult to adjust to the idea that they might now be on your side and have stopped throwing rocks. Furthermore, a lot of design people seem not to want

**Adapted from an address given at the Aspen conference, Summer 1966, reprinted from Dot Zero 2.*

to adjust; the belief that design is a thankless task definitely appeals to the martyr-complex that design has inherited from its artistic forebears. And furthermore yet, being out of step was a sure guarantee to their consciences that they were in the right, for design is also part of the great progressive do-gooder complex of ideas based upon the proposition that the majority is always wrong, that the public must be led, cajoled, sticked and carrotted onward and upward.

This is the evil backside on the face of public concern that is one of the better aspects of worrying about the state of the art. It leaves behind some unpleasant questions such as: The shine on the brow of the designer as he hands out the tablets of his lore; is that the true stainless glitter of Messianic inspiration or is it just the spray chrome of self-righteousness? Too many of the great unquestioned assumptions on which modern design is based have begun to peel and flake of late; neither they nor their advocates appear to be quite such stainless representatives of the shining new world as once we thought. It is high time we checked to see which ones have rusted through and must be junked, which need to go back in the plating tank, and which only need a wipe over with the silver-cloth.



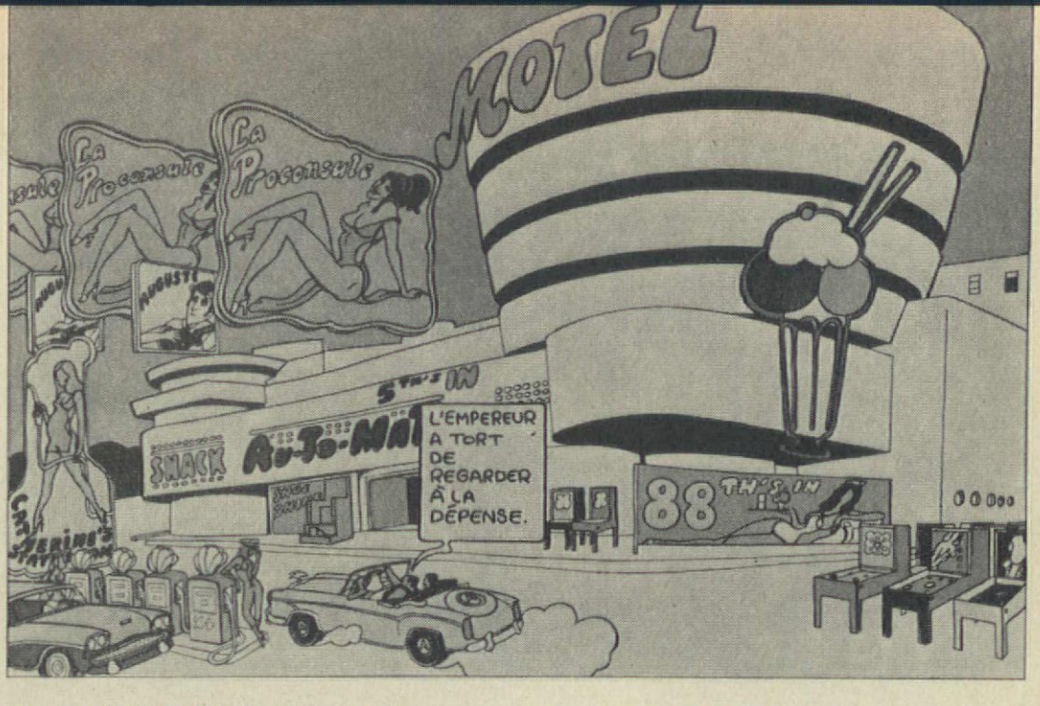
Architecture: action and plan*

Reyner Banham

Studio-Vista seem to be falling behind in their attempt to encapsulate the conventional wisdom of the colour-supplement world in neat square's packages. Not only have they lost Keith Critchlow's read-file of Buckmister-fillers for all seasons to Thames and Hudson (whose interest in mystical geometry comes wrapped in larger quantities of the green stuff) but they have got Peter Cook's book out so late that the imagery has gone cool and developed an over-day's pallor. Some of the ingredients go back before the Folkestone conference, even!

Sorry, but this really is disastrous. The essence, and the value, of the Cook-*Archigram* method is in its running dialogue with current images immediately they appear. It is the *instant* assignment of values, however temporary, to each new image, however puerile or improbable, the moment it swims into the architectural view-screen, that justifies the fuss we all make over *Archigram*—whether the images are validated by clipping chat on to them, or by being incorporated into some currently engrossing archifact. But to come upon something as old and wet as Vo Toan's parking-rocket *months* after it ceased to be hot, and nowhere near the text that might explain it, is to be forced to realize that the strategies which work so marvellously in a rambling, three-screen-and-part-of-ceiling, made up this afternoon, hand-held, image-saturation slide-happening with a Dennis–Peter–Warren soundtrack, just die the death on this kind of dreary old laid-out-by-a-real-typographer page. The wordage has got to come slap on the nose of the image, which happens on the *Archigram* page and with free-form slide-chat; but not here. North London video-tape in glorious Cromptochrome next time, chaps!

* *By Peter Cook. Studio-Vista, 12s. 6d*



The rarefied world of architecture

Withdrawn from the contagion of life, conscientiously standing for 'art' rather than 'living', architecture is notoriously slow to enter the public realm, to become part of the popular imagination. Most people will talk confidently and with feeling about a film, about books, music and plays, and even painting (largely owing to the efforts of adventurous advertising men) has moved from the rarefied, private world of connoisseurs and gallery critics to the domain of everyday life. But architecture remains a thing apart. No one knows much how to take a modern building, what to feel and think about it, still less what to say. There is no common critical criterion. Architectural magazines are bought only by architects. The jargon is impenetrable to all but the initiated. Architecture is a private world. The egotism of the architect finds its safety and its liberation in this limited sphere. It is jealously guarded. Outsiders are not expected to share in the mysteries. People may use modern buildings, but it is not thought likely that they will be able to enjoy them—at least, not for a long time. Which is presumably why most people prefer old buildings. They are familiar. They have entered into their lives.

The appearance of Frank Lloyd Wright's Guggenheim museum in a comic strip, almost twenty years after its completion, serves to mark the time lag between creation and popularization—(it can be taken also as a confirmation of the quip that Frank Lloyd Wright was the last of the nineteenth-century architects). Bruno Taut's fantasies too, have inspired science fiction cartoonists; the time lag was the same.

Comic book architecture is, on the whole, depressingly dull; faithfully reflecting the common lack of feeling for modern architecture. The Archigram Group, who combed the comics hoping to grasp at an exuberant, popular image of architecture, have come up with only one or two finds. They are traceable to Expressionist sources—seemingly the only easily assimilable architecture, which means that serious architects will have to learn to operate on a wider plane. For architecture to survive, it has to become a public art. Even the Frank Lloyd Wright extravaganza shown here, it must be admitted, is suspect; it comes from one of those sumptuous 'sex and violence' comic books—*Les aventures de Jodelle*—published in Paris by Eric Losfeld (others in the series are *Barbarella, Lone Sloane* and *Scarlett Dream**). These are designed, presumably, for those discriminating pornographers who once collected hand-coloured illustrated editions of *Salammbo*, but have now decided to swing with the times. For them the Guggenheim museum is a private reference, a joke to be shared by the initiated, like the Bernard Buffet painting, illustrated elsewhere in *Jodelle* that hides a wall-safe and the character Bloc-notes (who one suspects does not read *l'Express*).

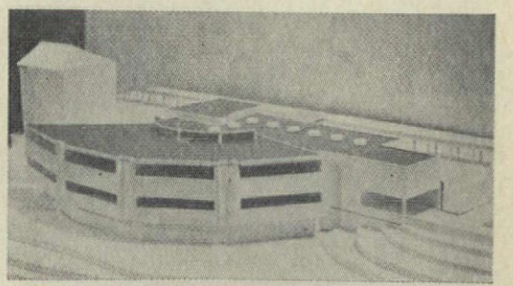
*** All available from Indica Books, 102 Southampton Row, London. 67s each**

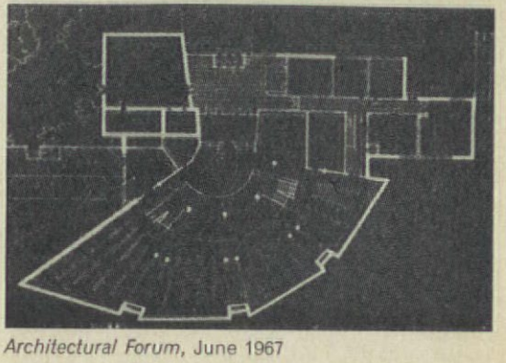
Happenings in USA

Alvar Aalto is to build a second building in the USA, a library for the Mount Angel Benedictine College, Mount Angel, Oregon. At first the monks demurred at the choice of so eminent an architect 'on spiritual grounds of possible inconsistency with poverty'. But their librarian cited a recent pronouncement by the Vatican that the faithful should live 'in very close union with the men of their time'. Aalto is still a man of his time and adept, it seems, at planning libraries. Of the fifty designs at present preparing in his office, fifteen are for libraries.

Louis I. Kahn has been appointed planning and architectural consultant for New Haven's largest urban renewal project, Hill Central, an area of 714 acres. Apart from the overall plan, Kahn will be responsible for the design of considerable low and middle income housing and a school.

Bates Lowry, editor of *The Art Bulletin*, will succeed René d'Harcourt as director of the Museum of Modern Art, New York, on July 1st, 1968. On July 1st this year Alfred H. Barr Jnr. retired as Director of Museum Collections, a post he has held from 1947. No successor to Mr Barr will be appointed; instead individual curators of the various departments will assume his responsibilities.



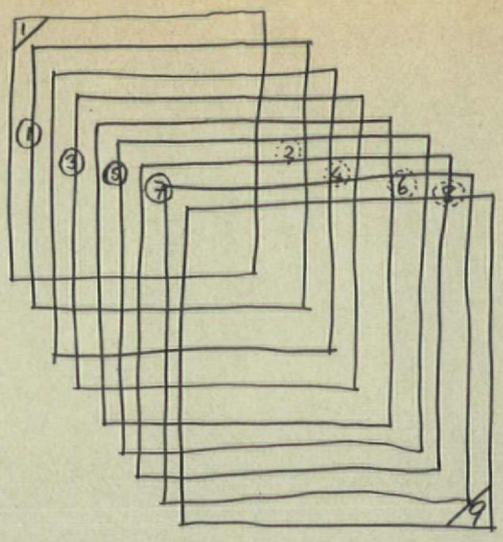


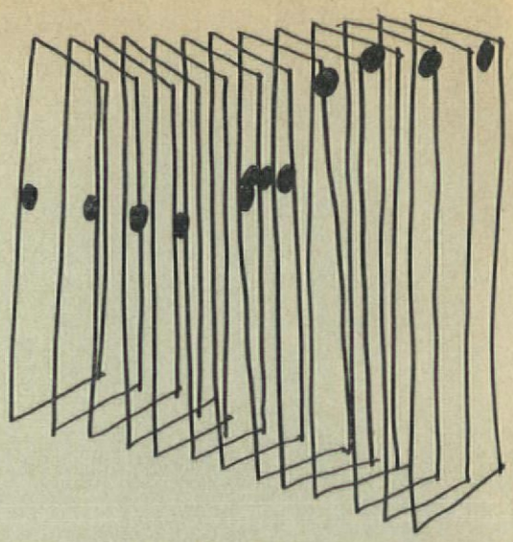
Architectural Forum, June 1967

Painting as an experience in time

Jasia Reichardt

Experiences come in layers. Inevitably they become fainter in time, gradually appear erased but, in fact, are never eradicated. This is an organic process and it is sometimes poignantly demonstrated in works of art whether it is arrived at intuitively or deliberately.
Schwitters' Merzbau, variously referred to as the Cathedral of Erotic Misery or the Big Column, is a good example of this process. The Merzbau was an environmental construction built by Schwitters in Hanover in the 1920s, over a period of years. It was constructed from the inside, with objects gradually buried as new layers of wood, debris and chosen items were placed on the surface. The Merzbau was an expanding accumulation of material from which nothing was ever removed, and the fact that the buried objects would never see the light of day again did not detract from the fact that they were there. Their spirit pervaded the entire construction.
Recently Bernard Cohen confounded the visitors to Kasmin Gallery by presenting an exhibition of large blank canvases each bearing a few more or less discernible circular patches of colour and nothing else. It is in relation to these paintings that one realizes the importance of knowing something about the process by which the final (albeit minimal) image is arrived at, since the image itself does not contain an implicit explanation. The patches of colour which are visible provide the residue of information about the content of the painting. The painting itself is a series of events which may involve as many as sixteen stages. Having sprayed a disc of colour in one corner Bernard Cohen





sprays the entire canvas with white; he then proceeds with the next circle of colour which once more is subjected to the same process. As each new colour image is sprayed over with white together with the entire canvas, the earlier images gradually disappear, and only a few discs, becoming fainter and fainter, remain within the entire area. The diagrams, which Bernard Cohen prepared, show the sequence of events within the work, or rather they provide a kit to the understanding of the facts which the paintings involve. With each spraying of the entire surface with white he stresses the completeness of the canvas surface, within which the coloured images are something of a violation. One could draw parallels between the relationship of the images to the white space as a state of unresolved conflict, although this is far from the more meditative qualities which are in fact evoked. Bernard Cohen's recent paintings provide one of the best demonstrations of the fact that works of art must be approached on many levels simultaneously, that the initial visual impact is only the beginning and that curiosity and intellect have their own pleasures. His paintings represent the final stages of a narrative sequence.

The sculpted world

A special number of the Dutch *Forum* was published in July, edited by the old, dedicated and committed editorial board—J. B. Bakema, Herman Hertzberger, Aldo van Eyck *et al.* A great deal of the writing is by Aldo van Eyck, but neither this new spurt of polemic nor the illustrated schemes suggest that the group have overcome their somewhat priggish provincialism. Their intentions are of the soundest—and are explained in detail and at great length—but these architects seem unable to give to their thoughts any real breadth of meaning and fail far too often to fuse them in an architecture that is more than an artistic display. Aldo van Eyck's Arnheim pavilion **1, 2** (built on the site of Rietveld's original one) is specifically designed for the display of sculpture, so it should presumably be exempt from such strictures. But it does convey, all too convincingly, that point of view that has come to be associated with the group—architecture is primarily a matter of art; a building is a piece of sculpture. Even Herman Hertzberger's admirable students' hostel in Amsterdam **3–5** is illustrated somewhat as a piece of sculpture. It is clearly valued for the modelling of elements on the interrelated restaurant floors rather than as an organization. To find out how it works (as, indeed, to find out more about Aldo van Eyck's pavilion) one must turn to John Donat's recently published *World Architecture* 4*, in which both these works and many such others are illustrated and explained.

*5 *gns, published by Studio Vista, London*

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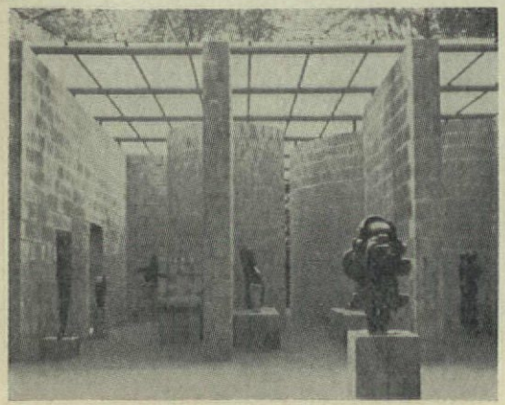

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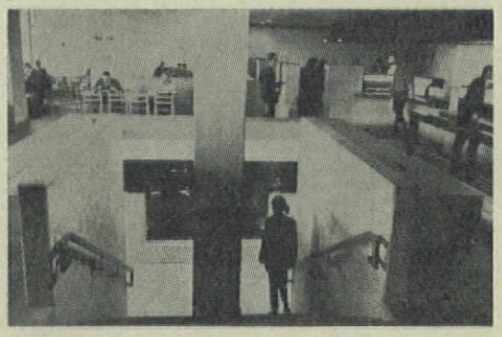

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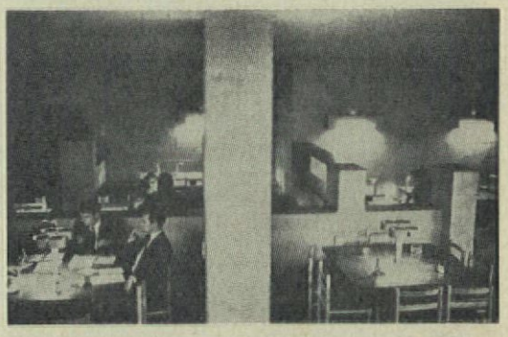

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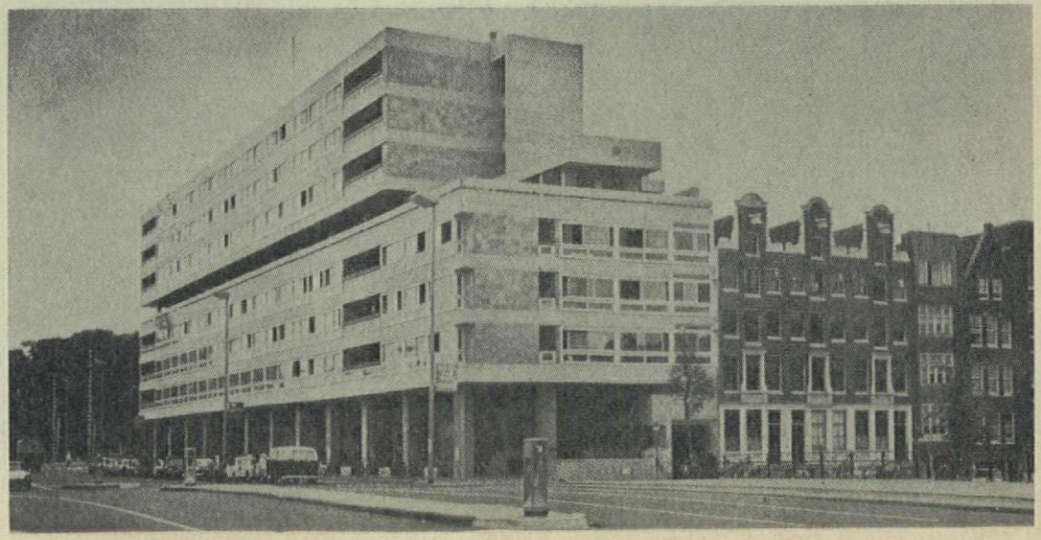


Around Britain

The East Midlands

Robert Cullen

Leicester and Nottingham, the two major cities in the East Midlands, are embarking on large-scale housing projects. Their approach is completely different although the problems are similar—growing cities overflowing into the country, leaving an urban renewal problem in the Victorian ring and a congested centre.

Leicester

Leicester's approach is many-sided. The planning context includes a new linked-to-the-city expansion area, Beaumont Leys (*AD* 4/67, page 156), for 40,000 people, renewal, at similar densities to the existing, and rehabilitation.

The renewal section of the programme includes approximately 800 units per annum for at least 10 years with 50 per cent of the accommodation for older people.

This housing is being tackled in a fairly unique way, with the City Architect as designer and builder. The Council have taken a bold step and have allowed the acquisition of plant at a cost of £117, 000 and the employment by the architect of a direct labour group. No separate building department has been created.

The gains which should be made are obvious:

(*a*) Real responsibility, which should ensure thoughtful design;

(*b*) complete integration, design and building operation including plant;

(*c*) feed back.

The snags will appear as the very considerable £3,500,000 contract proceeds.

Stephen George, however, had straightforward answers to a lot of difficult questions, e.g.: How are you dealing with stores on site and the attendant problems of security and pilfering? Answer: We have designed a package which includes all the finishings, fixtures, fittings and services down to the last nail and screw. This is delivered by crane to the flat, the floor over is then poured and the front door fixed and locked until the finishers commence work. This distributes the materials in the right quantity in the right place and means that a lot of front doors will have to be broken into before a worthwhile haul can be made.

There has been a work study on the pouring team (the flats are constructed in steel shuttered poured concrete) and special tools and work patterns developed, a bonus system will operate.

Parker Morris standards will be exceeded, segregated layout, footpaths on tops of garages, loose grouping of buildings around courts and 100 per cent garage provision.

Leicester should be worth a visit soon, quite apart from the prima donna gems at the University which are still worth seeing, and Victoria Park now has *three* tall buildings on its periphery—the Stirling and Gowan engineering building, the Lasdun building and the Stephen George single persons tower **1**.

Nottingham

Nottingham is tackling its housing problem in a very different way. It has a large programme of renewal and slum clearance, and that is that. There is no planning context, the city is still constricted by a green belt and split into unworkable sections by a system of primary highways designed independently by the City Engineer with no relationship to future land use. There is no brief to the architect from the planners which thinks beyond the confines of the side under consideration. The proposed programme speaks for itself:

	knocked down	built new	
		municipal	private
1961	—	837	333
1962	—	561	324
1963	—	404	246
1964/5	251	627	420
1965/6	631	481	413
1966/7	816	1007	471
and proposed for			
1967/8	?	1300	not possible to estimate
1968/9	?	2000	
1969/70	?	3000	

City of Nottingham council houses waiting list

1947	12,000
1962	6700
1967	4461

The City of Nottingham has major schemes nearing completion at Sneinton, Radford, Lenton, Hyson Green, and begun at Basford, Balloon Wood, and planned for Bulwell and St Ann's. Plus other smaller schemes, the upkeep of existing council estates and the care of much old property.

David Jenkin, the City Architect, in spite of these handicaps, is desperately trying to make each separate job look outside its confines and relate it to the city, but it is a heartbreaking task.

However, the Yorkshire Development Group, of which Nottingham is a member and David Jenkin Chairman, is making progress and the first major scheme, Hyson Green **2, 3**, has enough finished building to be able to assess the sort of environment which is developing.

Nottingham has been plagued by a rash of towers and the YDG housing is a considerable departure for the city, five-storey, decks, courts, large decks over garages, segregation, use of decks for other facilities, shops, fetes, play, schools.

Precast concrete is the medium with differing textures but uniform colour. This at present appears rather dull, but the rigid discipline may prove more successful with the incident which it is hoped will accrue with time on the decks and in the buildings.

The Hyson Green scheme provides 593 dwellings, 507 garages under the decks, 158 open car parks, with a density of 147 persons per acre at a cost of £2,411,000.

This is a large scheme and the problem of identity, pedestrian routes, public transport, the provision of other social amenities, etc., is already apparent.

If a programme of the size envisaged is to proceed without producing a terrifying result, a proper planning context is essential and the much needed additions, parks and social facilities, must be provided properly related and integrated with the housing.

The present ludicrous basis of fitting the housing and building between the primary network must be abandoned and the highway plan scrapped. A new plan, based on the establishment of environmental areas and current planning principles, must be produced and quickly.

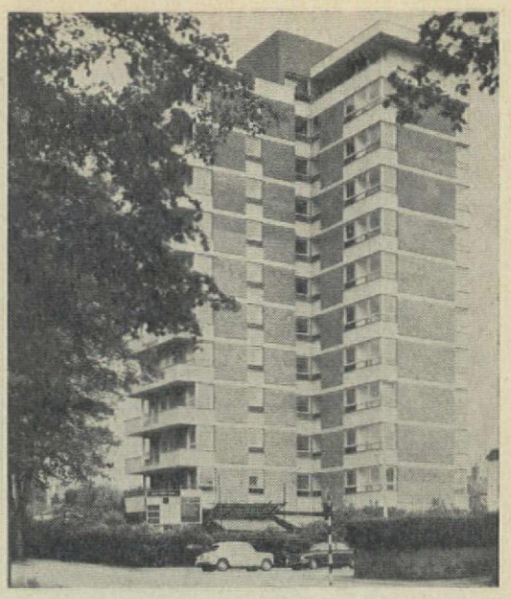
Nottingham now has a City Planning Officer who is a qualified planner but whose terms of reference specifically exclude highways which remain the responsibility of the City Engineer who was previously the Planning Officer. Yes, I agree, it is completely nuts but true.

Housing of quality in the private sector is non-existent. The speculators are rampant and the planners in all counties unable to check the pressures which are debasing nearly every village and street in the region. Some of this housing is architect designed, although the white horizontal boarding now does little to belie the truths of bad layout. When you discover a house or small group related to its environment it has invariably already been ruined by some unsympathetic unthought-about spec development across the road usually in larger numbers.

If the Editors do not want a repeat of this dismal story next year from me, ask any other architect who can still manage to keep his eyes open long enough without being sick and on this subject I guarantee the same answer.

Perhaps the new East Midlands RIBA Regional Council can be persuaded to look at this extremely unsatisfactory situation in the sector of private housing. Having looked at it, it is extremely unlikely that anything will happen until architects insist that all housing should be architect designed and the RIBA are prepared to discipline members who cut fees and produce incompetent designs.

Meanwhile, the East Midlands has had just about as much as it can take.



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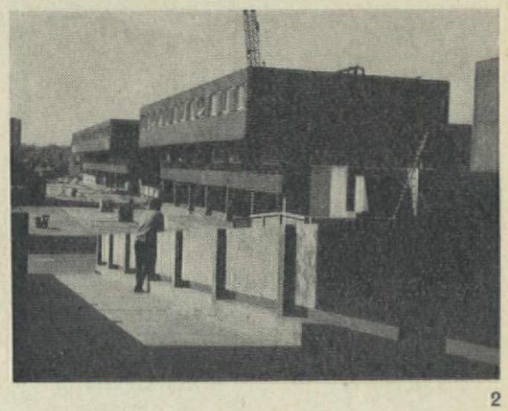

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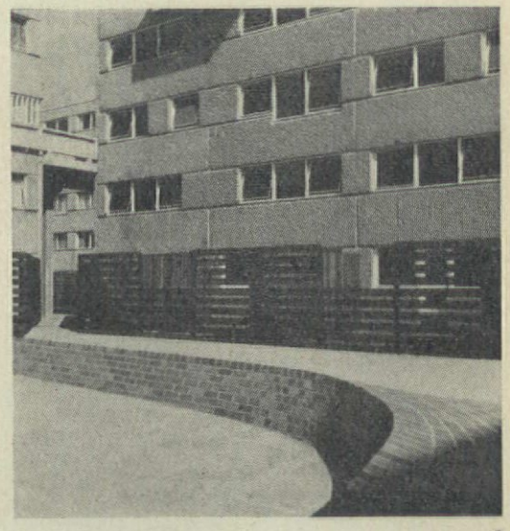

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One answer, having made a mess, is to hide it. Tree planting is still proceeding and increasing and Nottinghamshire is undertaking several large projects clearing derelict land and using gravel pits for amenity purposes.

Nottingham Civil Society is campaigning for a tree nursery for mature trees to transform the city in 15 to 20 years' time and cope with the inevitably huge losses of trees due to traffic improvements and urban renewal schemes. The ready answer from the Parks Superintendent, who immediately went on the defensive, was 'I have got a nursery and have 70 trees of a semi-mature or extra-heavy type'. He was joking of course, and would really like to have a tree nursery for mature trees and a tree-moving machine to boot.

Bell laboratory

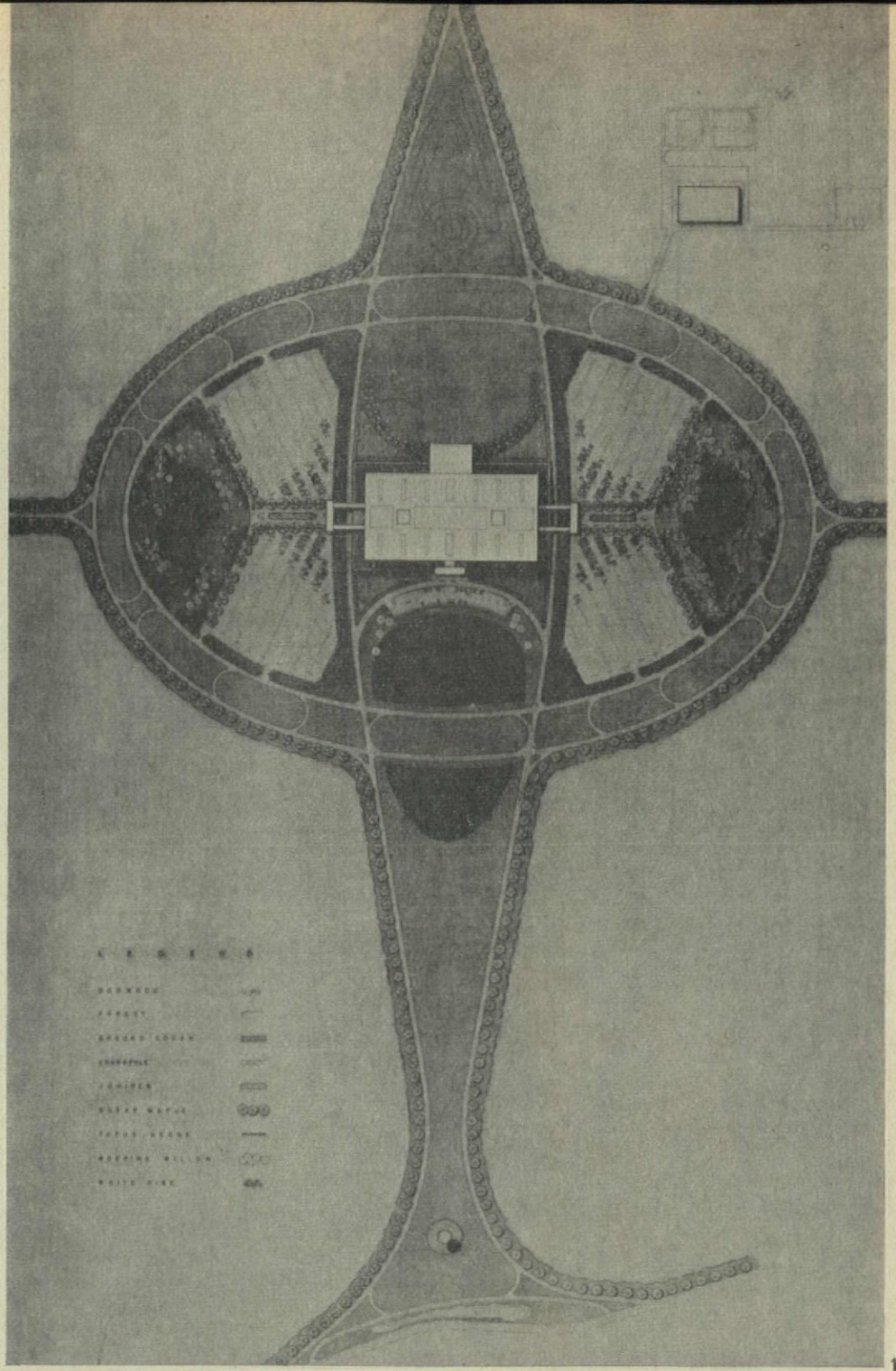
Anthony Vidler comments:

Eero Saarinen's Bell Telephone Laboratory takes its place between radar installations and a Nike X missile base as the third elegant and expensive piece of equipment to be deployed in the fields of Holmdel, New Jersey. The water tower, which acts as a monumental gateway to the complex, is as visible as the radar antennae that it shamelessly emulates; while the building itself seems, like the missile site, to be a part of the land on which it sits, disappearing behind mirror-glass façades that become the landscape on all sides.

The building is symmetrical, axially approached and set within an elliptical parkway that serves the two large parking lots at either end. In front, and the length of the building, lies a vast expanse of water that serves the air-conditioning plant. The central entrance is marked by a huge, detached horizontal plane; the entrances for staff at each end extend in long covered arms into the parking area. These entrances open into an internal space, top lighted and cruciform in shape, formed by the separation of the four main laboratory blocks. Vertical access is provided by two cores that join the blocks across the long axis and break the space into three parts. The short arms of the cross accommodate the central entry and reception lounge in the front, and a seldom used employees' lounge and stairs to the lower floor, in the rear. On this lower floor, below the main entrance level, lie all the communal large-scale facilities of the building: the auditorium, the cafeteria and lounges together with the computer centre and the plant rooms for each of the laboratory units. Above, these units are surrounded by continuous circulation that looks internally over the main space and runs between the mirror glass and the laboratory areas on the outer sides. Thus no offices or laboratories in the building are provided with external windows but are reached from short corridors that run across each block. The only fixed elements on each floor are the concentrated bands of vertical servicing and structure spaced across the block at intervals to provide units of clear floor space of 5000sq ft, which can be divided as needed into offices and laboratories. The entire partitioning system uses a six-foot module together with all the laboratory equipment and furniture. Even as the laboratories are serviced from the rear by a service 'wall', the offices have a storage wall of modular units. The joints in this 'erector set' are hardly visible; the system is flexible and remarkably speedy to manipulate. The effect is white, cool and precise, and this is perhaps as it should be.

We are accustomed to eulogize about the expensive materials and impeccable technology of American business architecture, the high-minded Victorian enterprise and good taste exhibited in the great banks and post offices of Chicago and New York. The tradition is brought to a pitch of refinement in Holmdel that must be admired; we are even presented with a vast banking hall to complete the analogy. But the activity that informs the central spaces of New York and Chicago is absent: in its place sit large and ugly tubs filled with exhausted plants. The generating volume of the whole building, equal in size to the laboratories themselves, surrounded by galleries and as long and high as an urban street, has no function to perform. All that could give it life is placed beneath its floor, in the communal basement, without daylight together with all other operations that might tend to destroy the perfection of the system above: a system that in its rigidity cannot tolerate activity for which it was not conceived.

In the development of an architectural vocabulary it is generally assumed that the value of a particular system of order lies in its ability to accept and give heightened meaning to the exception to the rule. The existence of such dialectic is almost a necessary condition for the creation of any system of reference. In Holmdel, as in much present American work, it becomes evident that the system is not one of order, but of technique, developed with a literal-minded passion that not only cannot express the various levels and kinds of activity that make up the whole, but in the end works to their exclusion.



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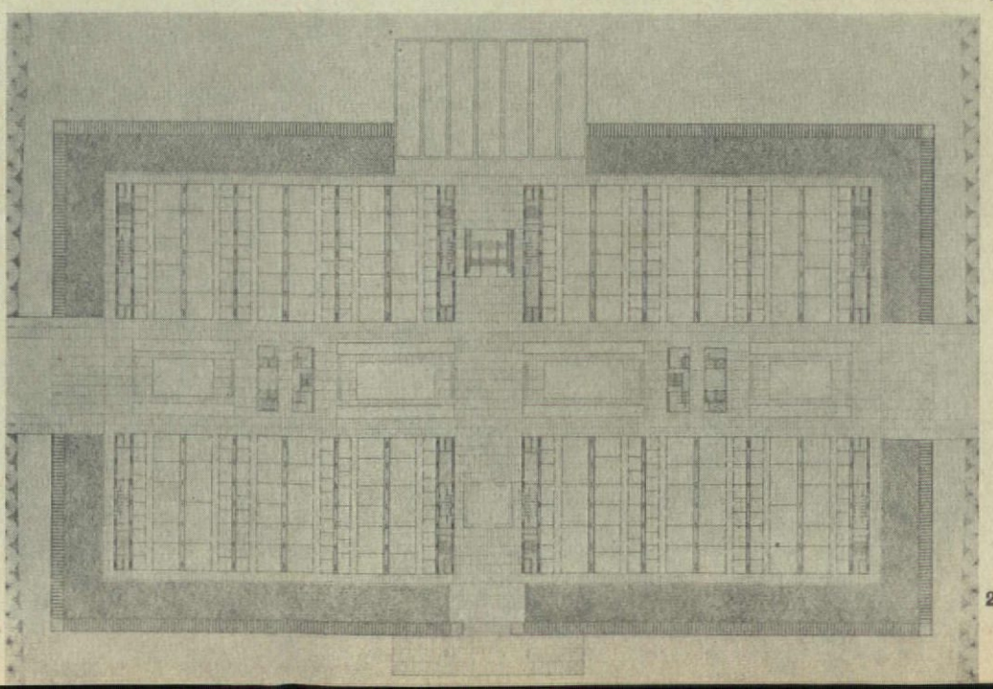

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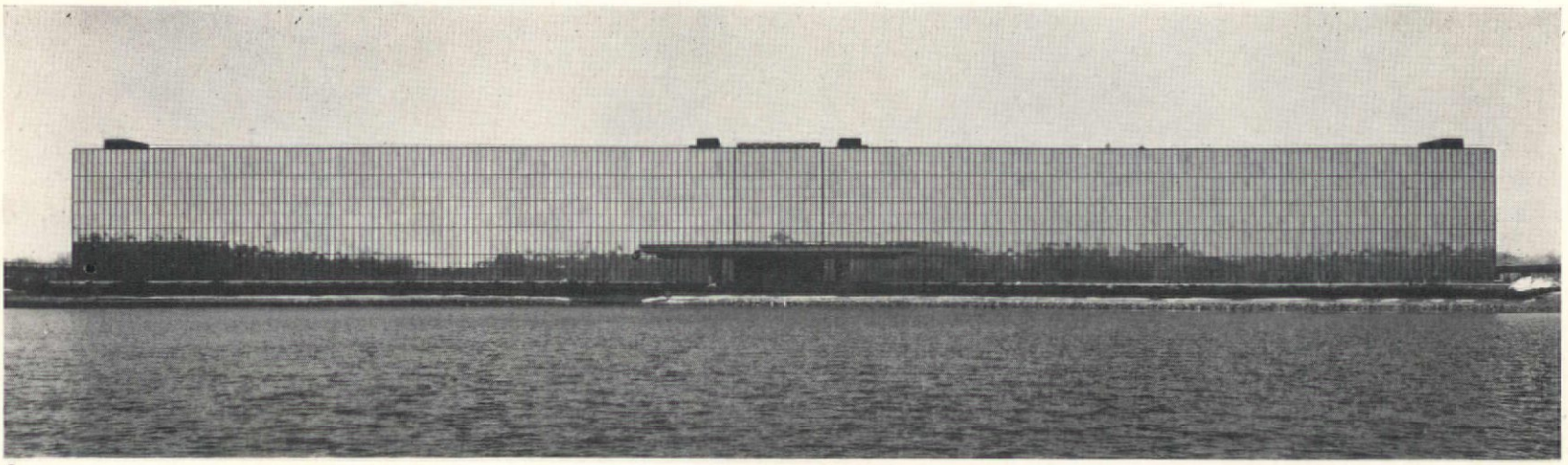

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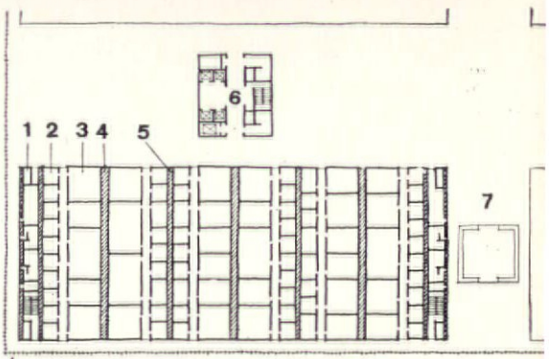
Bell Telephone Laboratories Holmdel

Eero Saarinen and Associates

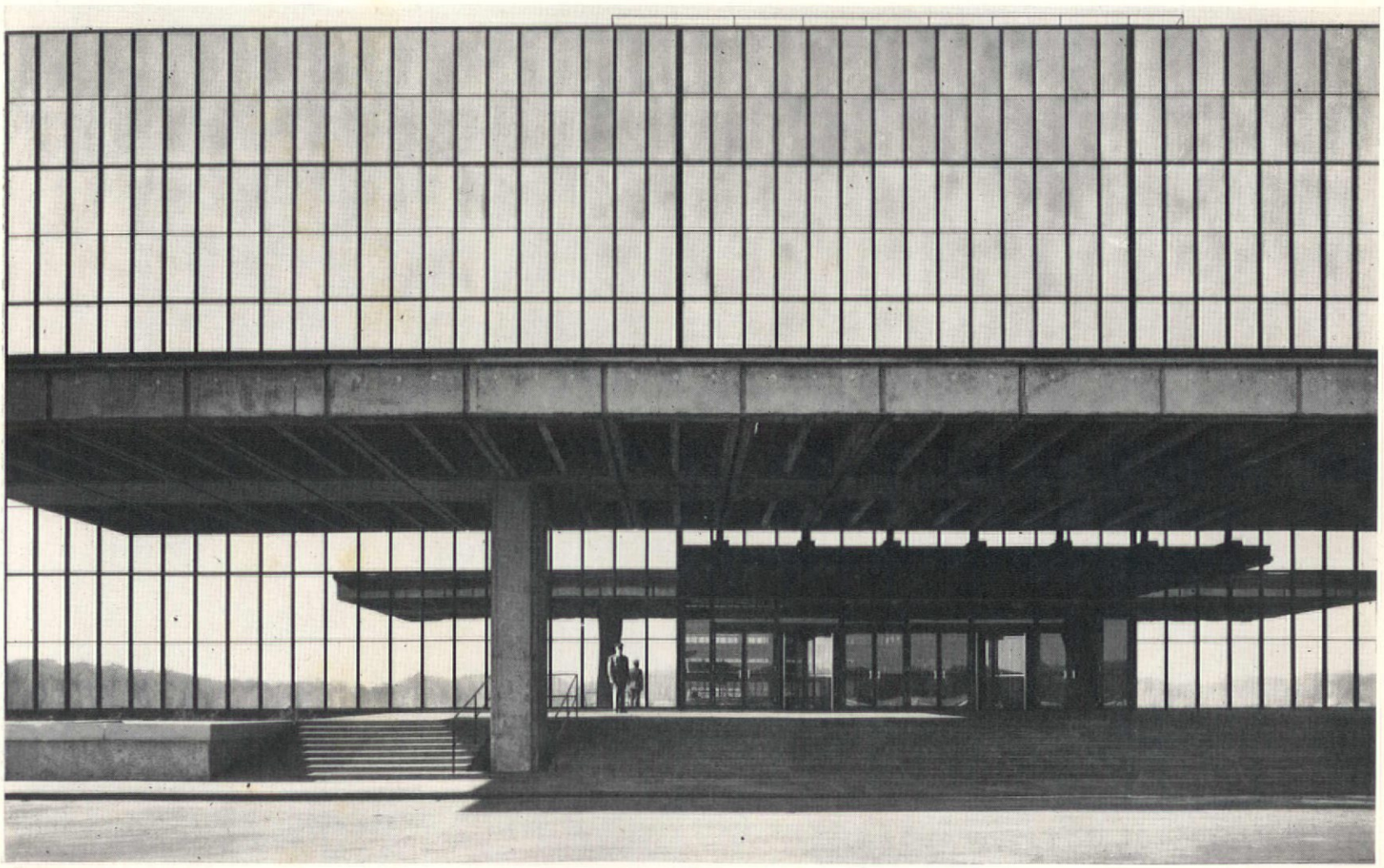
The site is a 460-acre park off the New Jersey turnpike one hour from Manhattan. At the entrance stands a 300,000-gallon steel water tower. The drive leads past it, meets a six-acre pool and divides into a huge oval distribution road which encompasses the parking areas and the building itself. This oval is 1000 yards in diameter and feeds 4500 parking lots, the furthest lot being 220 yards from the start of covered pedestrian walks which bridge service roads and lead into the building. ▷359



4

1 cloakrooms and utility
2 offices
3 laboratories
4 services core
5 storage walls
6 vertical access
7 reception lobby

1
Site plan. 8 inches is approximately 1 mile
2
Typical floor plan
3
View of the entrance façade across the six-acre pool. The pool cools water used in the air conditioning system and is also available for fire fighting
4
Detail floor plan of one of the four blocks, 300ft × 120ft
5
The entrance canopy
Photo: 3 & 5, Cervin Robinson



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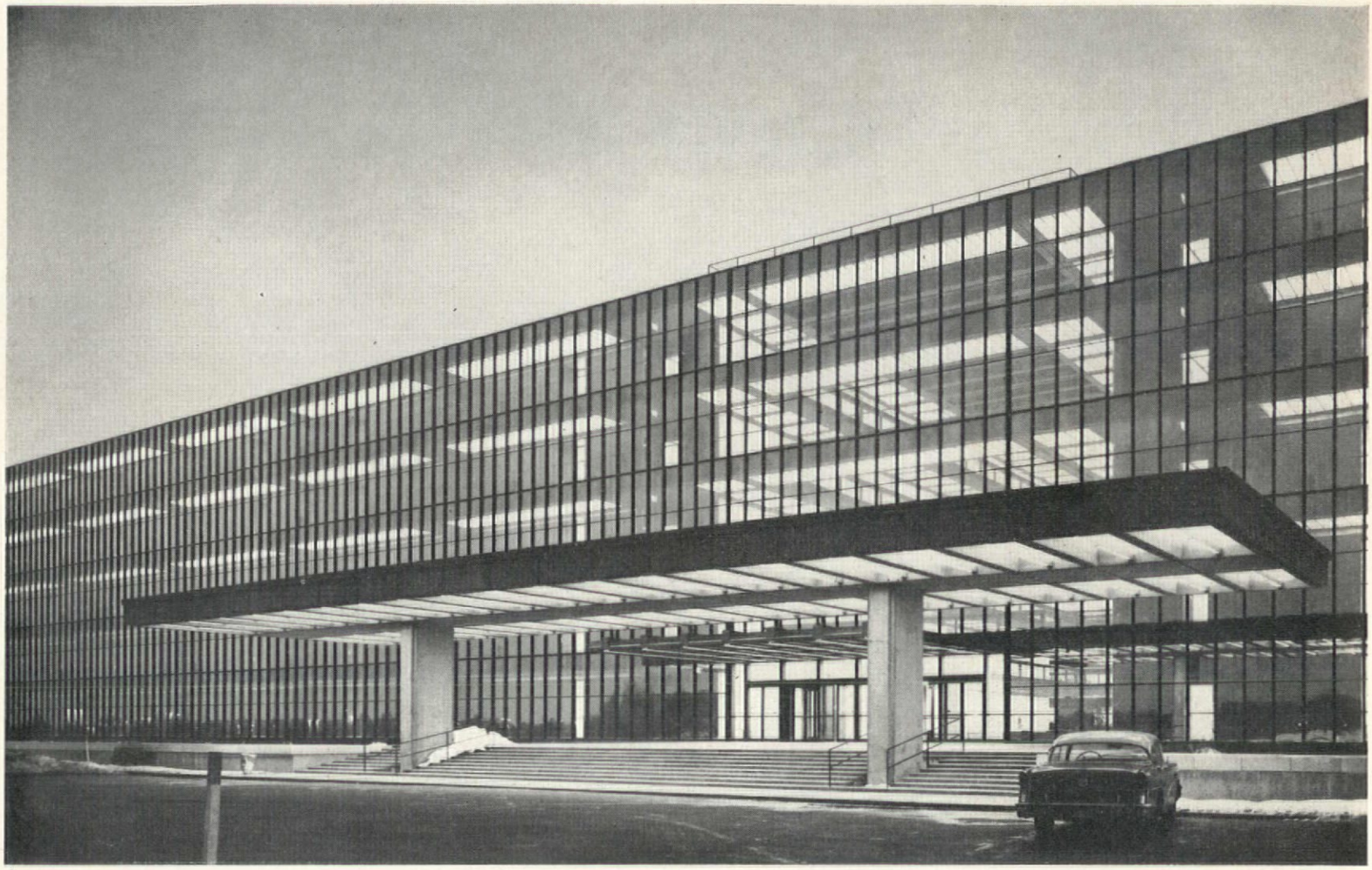

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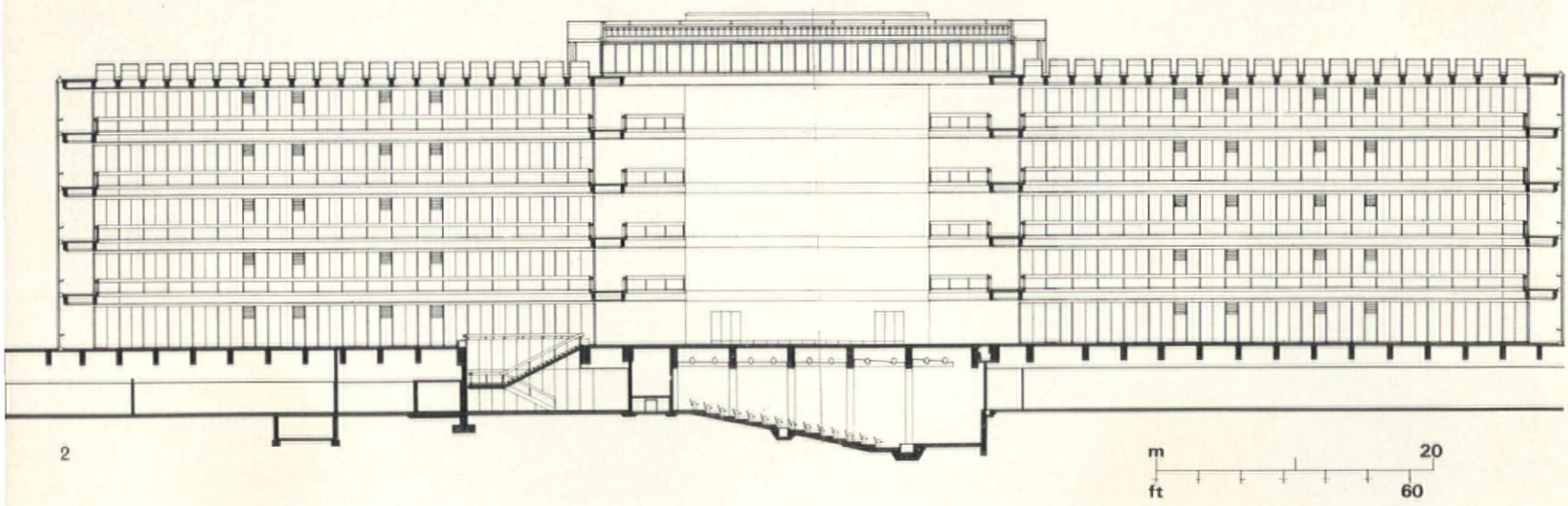

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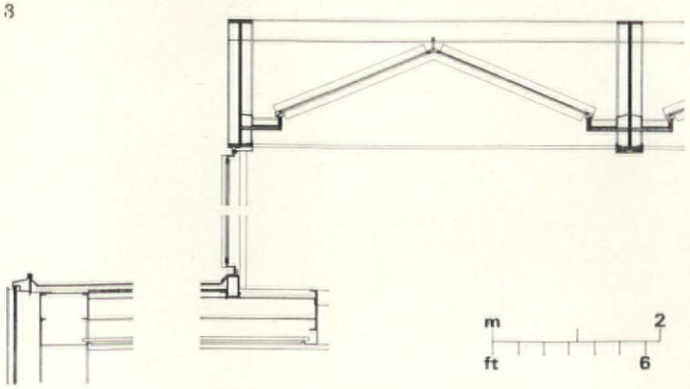

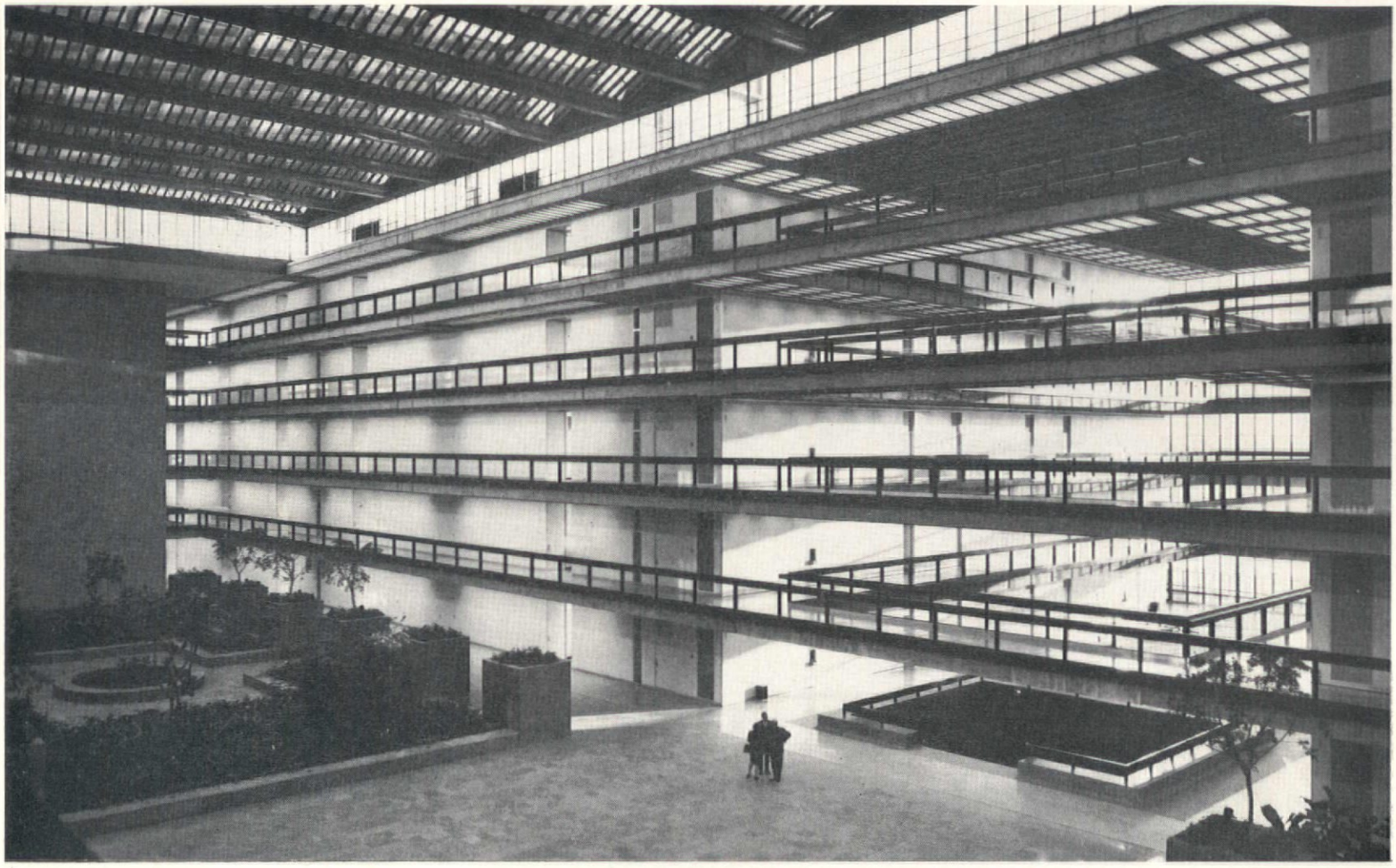

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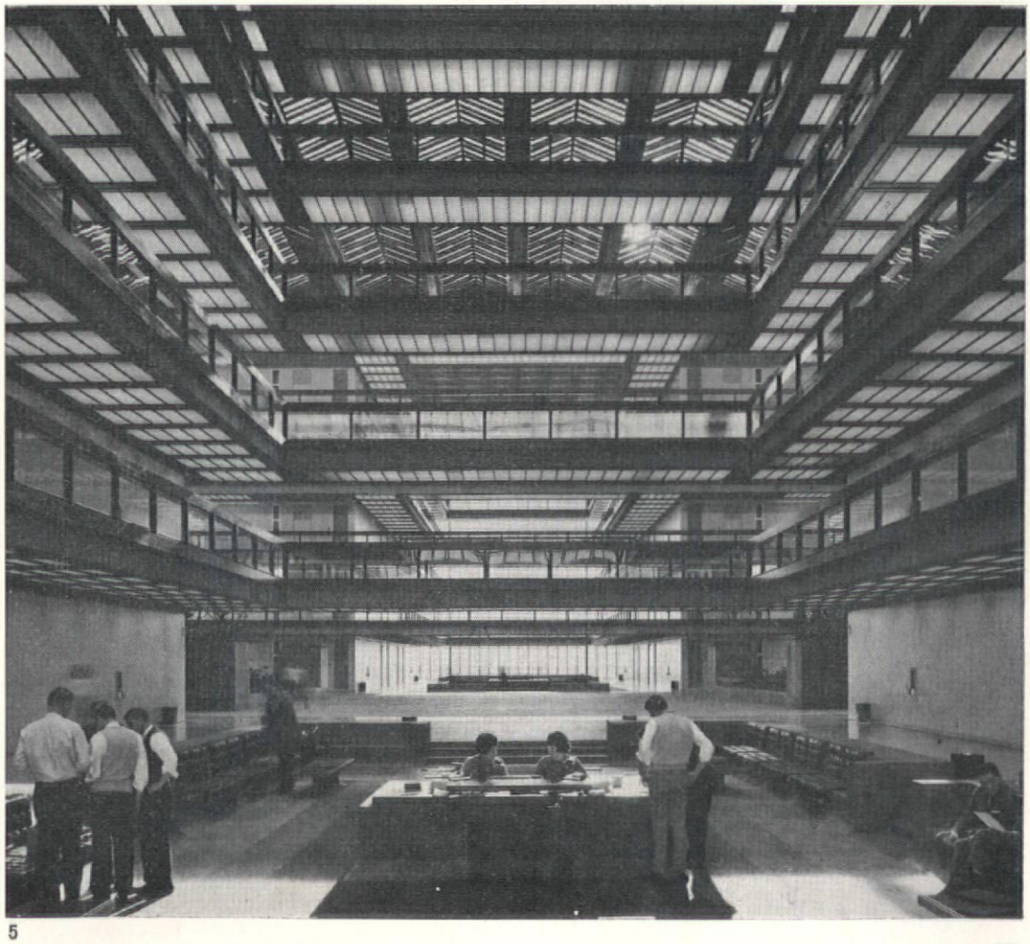

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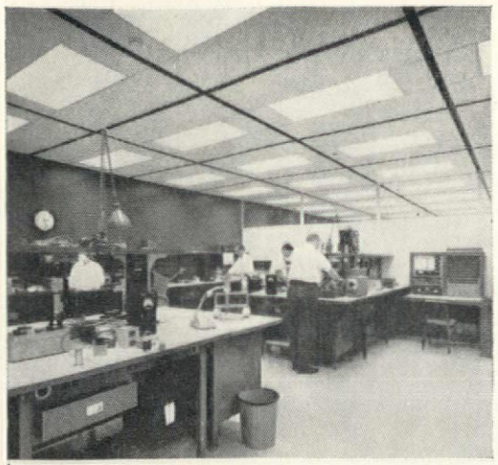
1
At night the mirrored glass reveals the interior
2
Cross section through the reception lobby and employees lounge at ground level. Below are situated the library, canteens and auditorium
3
Detail of the roof at the perimeter (left) and the skylight over the galleria
4
The crossing of the central areas with a vertical access shaft on the left and triforum passages connecting at all levels
5
The reception lobby with the employees' lounge (the largest conversation pit in the world) in the background
Photos: 1, 4 & 5, Cervin Robinson



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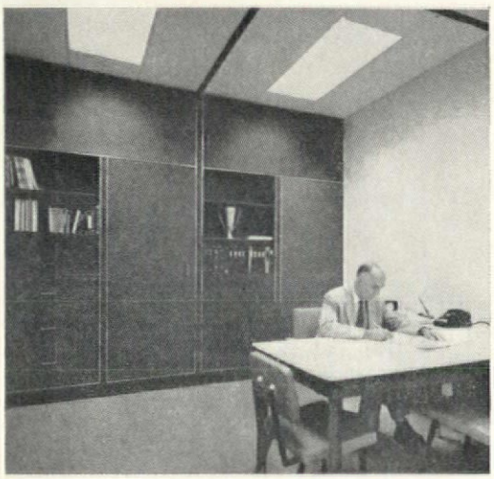

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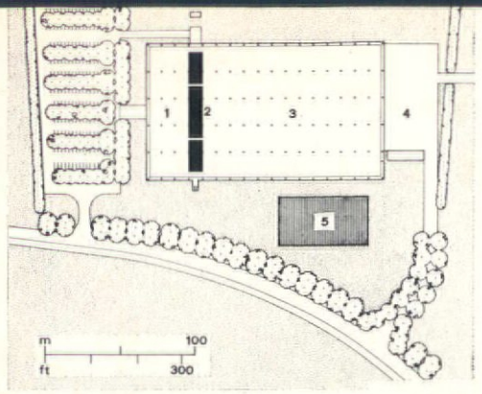
The first plans were drawn 10 years ago by Eero Saarinen. The maximum number of 5000 employees were to be grouped into smaller units. This was demonstrated by making four six-storey blocks and servicing them as separate units, but enclosing them as one structure. The first two blocks were opened in 1962. The spaces between the blocks are roofed over and form a cruciform six-storey high 'galleria', the long axis being laid out as an internal garden 700ft long and the short axis as a reception lobby and employees' lounge. Canteens and library are sunk into the excavated side of the building giving the laboratory and office areas an uninterrupted symmetry from the ground floor upwards. The shorter ends of each block contain cloakrooms and utilities and parallel to these there is an alternation of offices, corridor, laboratories, service and column duct, laboratories, corridor, offices, storage wall, offices, corridor, etc. The laboratories are 24ft deep and the offices 12ft deep on either side of 6ft wide corridors. The partitions are movable and different room widths are available. Circumscribing each block on each floor is a triforum passage for access and perambulation. On two sides it has views over the park, on the other sides into the galleria across which they connect with other blocks.

The main structure is in reinforced concrete with column bays 45ft 9in × 18ft. For the first phase the south façade was glazed with mirror glass. At that time the manufacturer was unable to supply for the other walls which used heat-absorbing glass. Since then, however, the supply problem has been overcome and the mirror glass has been so successful in preventing solar heat gain (70–80 per cent reflection) that it now encloses the whole completed building.

1
Twenty-four foot deep laboratory room. The dark wall conceals the services duct
2
Twelve foot deep office showing storage wall
3
View down an access corridor shows the unoppressive effect achieved by glazing the partitions at high level
Photos: Forum, *October 1962*

Cost:
12,000,000cu ft, 1,200,00sq ft for $34,000,000



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5

Cummins Engine Co offices and factory Darlington

Kevin Roche, John Dinkeloo and Associates

Photos: Balthazar Korab

This building was designed by Eero Saarinen's former office for the Cummins Engine Company on a site near Darlington, England, as part of the Government's industrial development programme for that region. It took 14 months to construct and cost approximately 85s per sq ft

▷362

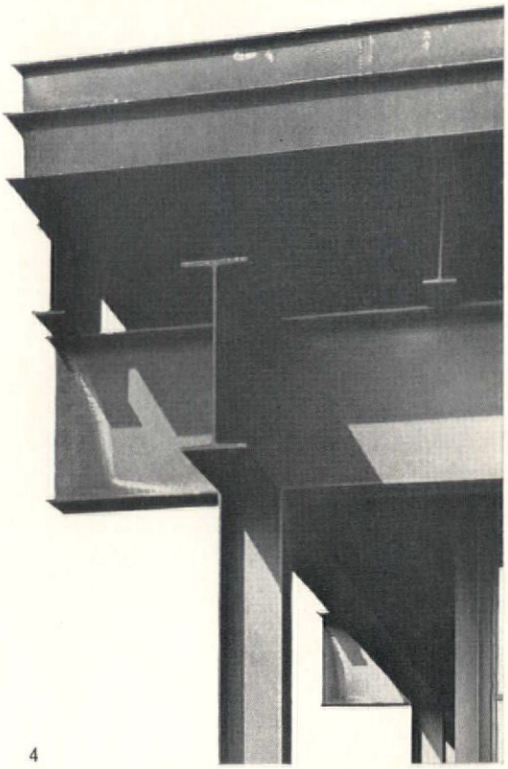
1
Site plan
1 offices
2 utility and plant room
3 factory
4 yard
5 pool

2
General view of the exterior

3
The yard behind the factory area shows how industrial clutter lying about can be enriched by an ordered background

4
The entrance façade

5
Detail of a roof corner. The purlins are separated from the main beams by 18in plinths



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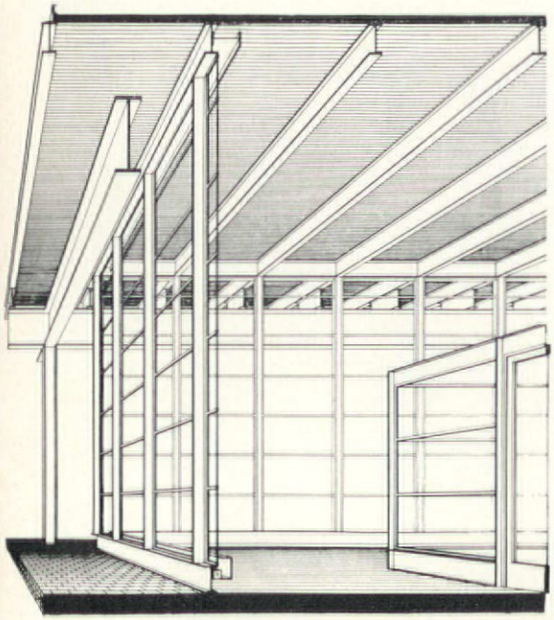
for 158,000sq ft floor area, excluding site and factory machinery, but including a cafeteria. It uses high strength rusting steel (AS441)* and structural neoprene glazing gaskets for the first time in this country.

The plan is a simple rectangle 510ft × 300ft with 60ft × 30ft structural bays. The office and factory areas are divided by a transverse brick core containing mechanical plant, stores, cloakrooms, etc. The columns carry 2ft 10in main beams on which are set 18in plinths carrying 12in purlins. This provides a one-way 2ft 6in space between the main beams and the roof deck and an 18in space between the main beams and the purlins on the other axis. Air ducting and other service requirements use this space in the roof structure. The air conditioning is powered by roof-mounted units, each serving six structural bays. Additional bays can be built on without affecting the existing system.

The offices are partitioned using the same materials as the exterior, rusting steel (AS 441) and neoprene glazing gaskets. There is no false ceiling. The building sits on a blue brick-faced plinth in which the services core is also constructed. The floor finish in the offices is sisal carpeting and in the factory granolithic. There are no false ceilings except for some small offices which are constructed as separate structures within the main envelope.

* See John Deere building, *AD*, August 1966, and 'Rusting Steel', *AD*, March 1967.



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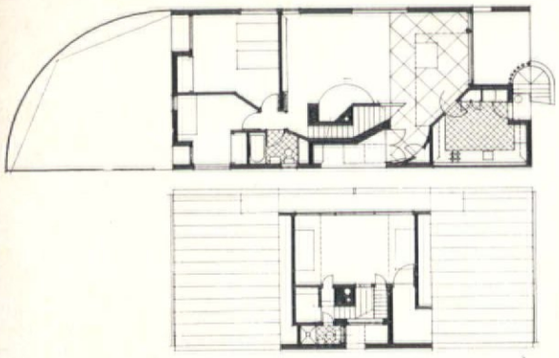
1
Perspective of the structure, with an internal partition using similar detailing to the outside walls

2 & 3
Views of the office area



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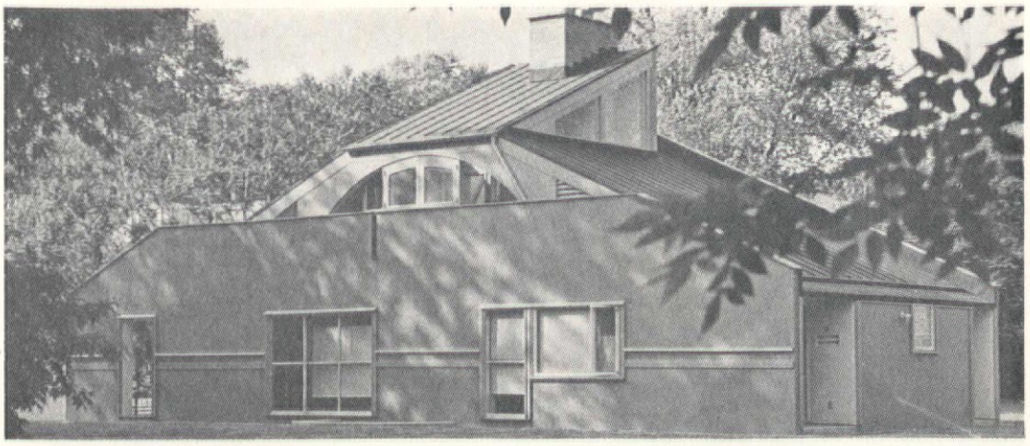


2

Robert Venturi

Alan Colquhoun

Robert Venturi belongs to the school of thought, prevailing particularly in America in the last few years, which has reacted against the rejection of tradition implicit in modern architectural theory. This case has been presented from widely different points of view, and there seems little in common between Lewis Mumford and Jane Jacobs, who represent, in their different ways, its sociological wing, and Vincent Scully, for whom architecture is essentially a hermetic discipline with its continuing tradition of myth, and who was able to write a monograph on modern architecture without once mentioning its ethical or technological basis.

Venturi follows Scully's viewpoint closely, in his book *Complexity and Contradiction in Architecture** but the argument put forward in this book is difficult to paraphrase because it is highly idiosyncratic and must in some sense be taken as an apologia for his own work. In fact the second part of the book consists of an illustrated *catalogue raisonnée* of this work. We are thus invited to interpret his book on two levels, firstly as an elucidation of his creative work, and secondly as a polemic against the simplistic doctrines of modernism.

His text is accompanied by numerous photographs and plans and consists of a critique of architectural history from a frankly biased point of view—the point of view of the artist-philosopher rather than the historian. In adopting this posture he is able to make a number of original and interesting *aperçus*, which he organizes—somewhat loosely—under the main headings of complexity and contradiction—qualities which he sees as important to stress because they have been ignored by modern rationalist theory.

It is possible to accept his general thesis and to see his analyses as an important contribution to architectural perception, but at the same time to sense the lack of complete theoretical framework. If complexity is important, so is simplicity; the one concept is meaningless without the other; and while he admits that coherence is necessary too, he does not define the means by which this might be achieved. Complexity as such, can only be demonstrated as necessary if it is part of a particular tradition with its internalized mythology. If we hold up such a tradition as an example of inner consistency we are driven to a relativistic position in which we can no longer give to it any absolute value.

It seems incontrovertible that the objective facts of a given technical, economic and social environment are vitally important components of all mythologies. Indeed, the whole history of thought can be seen as a recurrent process of breaking down mythologies, each successive phase creating, in spite of its intentions, a new mythological structure.

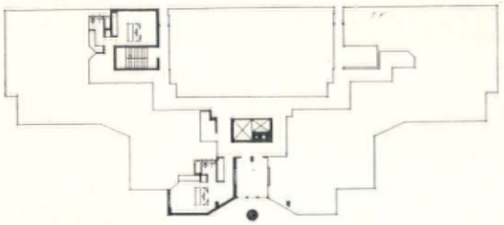
However much, therefore, one accepts the idea of the continuation and transformation of tradition, it is impossible to say that it should be preserved in this or that form. In his preference for the architecture of the Mannerist, Baroque and Eclectic traditions, Venturi is suggesting just this. For him contradiction means the specific contradiction which comes from the conscious adaptation of a particular formal tradition to contemporary uses—a complicated process which he never demonstrates to be necessary. The conflicts, non-resolutions and ironies which result belong to the same species as conflicts which could conceivably result from another set of assumptions, as indeed they do in the case of Le Corbusier, in whose work the need to maintain references to conventional elements such as windows, doors, the *piano nobile*, and the general vocabulary of the Beaux Arts, operates within a rationalist and functionalist framework. Indeed, Venturi himself analyses the work of Le Corbusier and Aalto in terms of complexity and contradiction; and in so doing invites a radically different interpretation of these qualities than the one he offers himself.

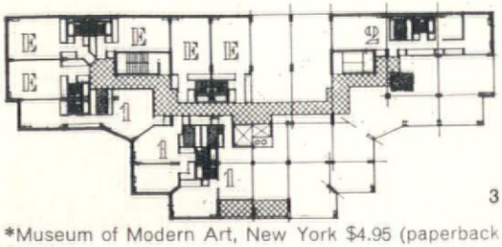
It is difficult not to suspect that the kind of irony and conflict which Venturi's own buildings express is of a different order from that of, say, a sixteenth-century mannerist, and this could offer grounds both for justification and criticism. Venturi is not so naïve as to take up an *art pour l'art* position, and makes several attempts to provide a sociological and ethical framework within which to fit his exclusive concern with the semantic and non-literal dimensions of architecture, as the following rather disingenuous passage indicates: 'The architect who would accept his role as combiner of significant old clichés—valid banalities—in new contexts as his condition within a society which directs its best efforts, its big money, and its elegant technologies elsewhere, can ironically express in this indirect way a true concern for society's inverted scale of values.'

It is a little surprising to find that one is being asked to interpret Venturi's irony, which he has spent the greater part of his book defending on historical grounds, as an act of immediate moral protest—one moreover that would lose its meaning if society ever decided to redirect its technological energies.

The work itself, too, often displays conflict on the level of an all too simple opposition between street façade and functioning space behind. The 'public' face of the building becomes a paper thin plane, totally vestigial and rhetorical, with Baroque 'unifying' motifs inscribed tentatively on the surface. At this point one becomes aware of an attempt to annexe to the world of 'art' the most degenerate aspects of American vernacular, and to see the categories of Pop art being brought in to shore up procedures of precarious historical validity.

It is easier to accept these procedures when they are applied to small-scale private works, such as the house for Mrs Venturi near Philadelphia **1, 2**. In a suburban situation such a *jeu d'esprit* does not seem out of place, but only because the importance of such a statement seems marginal in terms of the larger environment. This building can be interpreted almost as an easel painting or a sculpture, and leaves one's mind free to enjoy the subtleties of a 'learned' game set up by the architect for private enjoyment. When, however, Venturi works on a larger scale, as for instance in the Guildhouse flats, **3, 4** the self-conscious semantic elements such as the string-courses and semi-circular windows, do not seem to make any significant public statement. In the house the grammar is arbitrary, but can be justified by the degree to which the functions of a house are themselves ambiguous, whereas in the Guildhouse where the functions are reduced to a repetition of simple cells, the symbolism becomes detached from the function, and cannot be developed consistently. Is it valid, as Venturi does, to justify this lack of consistency on the basis of yet another level of irony?





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*Museum of Modern Art, New York $4.95 (paperback $2.95)

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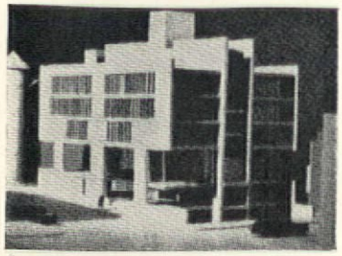

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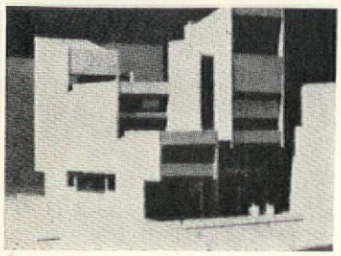

2

Boston Architectural Center, Boston, Mass.

Ashley, Myer and Associates

Structural engineers: Le Messurier Associates

In 1889 the Boston Architectural Club was founded—primarily to train draughtsmen and designers. For half a century and more the Beaux Arts studio system was upheld there, but by the end of the Second World War the tradition had weakened and interest in it had lapsed. In 1944 the club was reorganized as the Boston Architectural Center and, with some misgiving on the part of the old members, the curriculum changed. The main activity of the Centre has thus remained teaching; 325 students are still taught by 70 members of staff. Most teaching is in the form of evening classes, nor are the standards of admission as rigorous as in other established schools. Almost anyone with certain basic high-school credits and the $300 yearly tuition fee is admitted. Half of these drop out by the end of the first year. Few complete the five-year course and the thesis required for the BAC certificate. But interest on the part of already established architects is widespread, many of whom enter the school for short refresher courses.

The erection of this new building was not, at first, envisaged as part of the programme of reorganization. Forced to vacate the converted houses on Beacon Hill that they had occupied for 50 years the Trustees purchased a three-storey stable building on the corner of Hereford and Newbury Streets, in the Back Bay Area, that they intended to convert. The stable building was less sound than expected; structural reinforcement and conversion costs were estimated between $250,000 and $350,000. The cost of a new and much larger building was estimated at $500,000. There seemed little option therefore, but to rebuild.

In 1963 a competition for the design of the new building was organized, limited to architects

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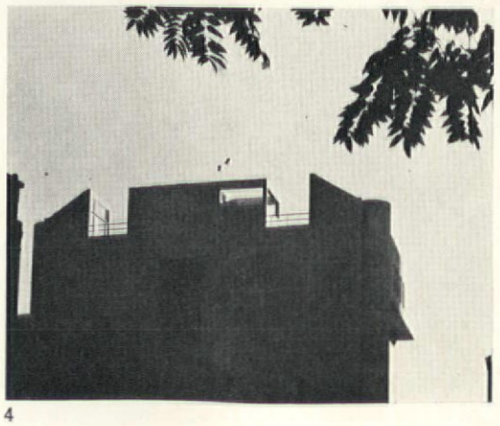
Jury comments:

First prize: Design *awarded first prize for its excellent planning, its straightforward architectural expression and its highly logical and economical structural system, which employs prefabricated elements. The highly disciplined solution recognizes the limitations of the party wall, placing services and vertical circulation elements on that side, thereby providing maximum divisible and flexible space.*

Second prize, Chapman & Goyette: *The clear plan, the dignified and orderly exterior and the highly logical structural system gives this design great merit. While the design generally has good character, the central circulation weakens the flexibility of the plan. Stairs probably do not comply with fire code requirements and there are inconsistencies on the Newbury Street side of the central spine.*

Third prize, Robert G. Herman and Peter Woytuk: *The jury found this entry to be worthy of third prize mostly because of the brilliance of its concept and presentation. One of the most interesting and sophisticated of all the entries, it is a case where the jury wished the designer had applied the same care and enthusiasm in the fashioning of a more practical plan.*

3



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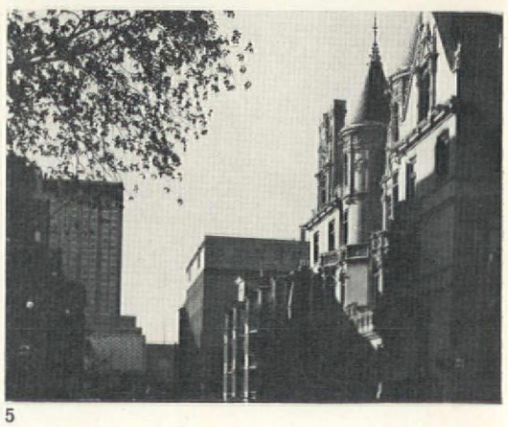

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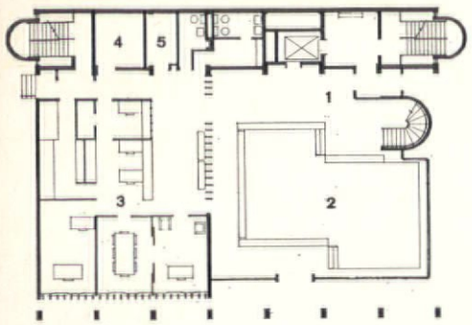
1
Second prize design by Chapman and Goyette
2
Third prize design by R. Herman and P. Woytuk
3
View from the south, down Hereford Street, with the corner turret of the adjoining fire station (soon to be demolished), that inspired the stair towers of the BAC building
4
Exposed concrete frame and brick infilling panels at the rear
5
View from the north, up Hereford Street, with that dominant Boston landmark, the Prudential Tower, on the left
6
Ground floor plan
7
First floor plan
8
Second, third and fourth floor plan
9
Fifth floor plan
10
Cross section AA
11
View from the corner of Hereford and Newbury Streets. The organization, the structural framework and the material finishes are all quite explicit in the design of the façades. This honesty of expression is not, however, without its drawbacks—the rough boarded concrete work, for instance, has become a depressing grey since these photographs were taken

Photos: 3, 4, 5, 11 Lois M. Bowen



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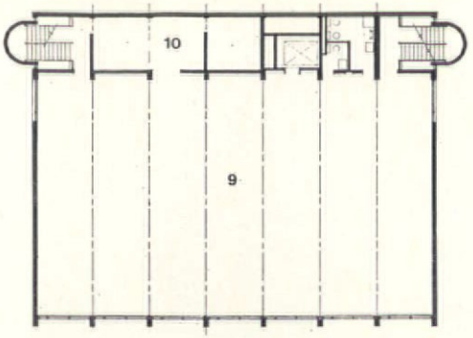

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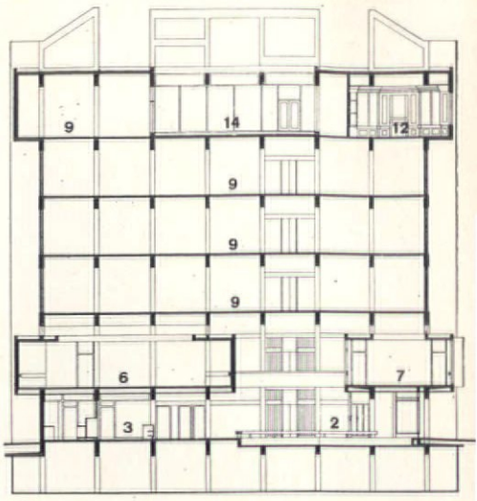

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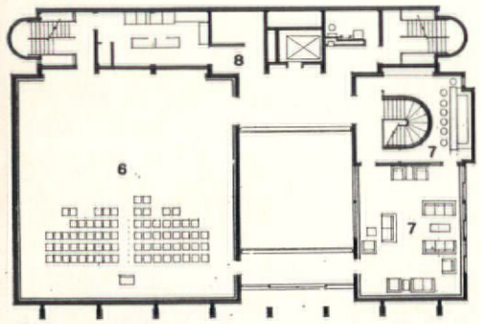

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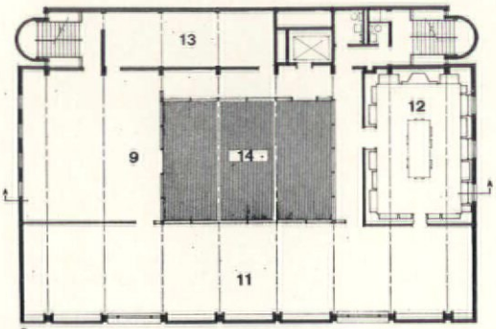


9

1 lobby
2 exhibition
3 offices
4 janitor
5 coats
6 meeting room
7 lounge and bar
8 kitchen
9 studios
10 workroom
11 library
12 memorial library
13 thesis office
14 court

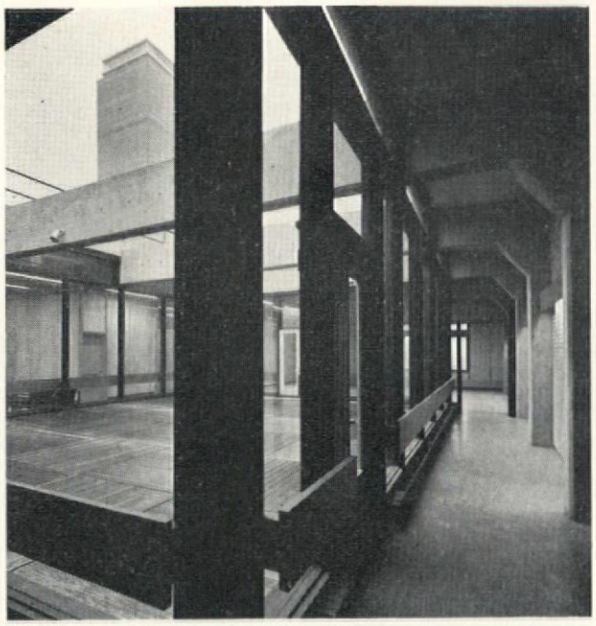
11

<1363

registered in the state, members of the Boston Society of Architects, Massachusetts State Association of Architects, and the BAC itself. The prize money was only $5000, which was to be regarded as 'payment on account'. Yet there were 89 entries. In January 1964 the judges met: Pietro Belluschi, José Luis Sert, Arcangelo Cascieri, Stanford Anderson, Benjamin Thompson, James Lawrence and Ralph Rapson, with William Le Messurier as non-voting structural consultant and Walter Bognor of Harvard as non-voting professional adviser. The jury found that 'there was too great a striving for exciting forms . . . not very suitable to the smallness of the site'. But six out of the seven jurors agreed to award first prize to Ashley, Myer and Associates. The second prize was won by Chapman and Goyette (with Maki and Bennetts as associates), the third by Robert Herman, with Peter Woytuk for Progressive Design Associates.

The jury praised, in particular, the prefabricated elements of the winning design—meaning the pre-cast, prestressed concrete beams. These were the subject of the only major alteration in translating the design into architecture. Pre-casting was found to be more expensive than *in situ* concrete work. But visually no changes were made to the competition design during the process of construction. The lowest tender, amounting to $637,000, was vigorously cut, but most of the items cut out have since been restored, paid for by gifts, government grants and low-cost educational loans. Other items have been added, bringing the total cost to almost $1,000,000.

1



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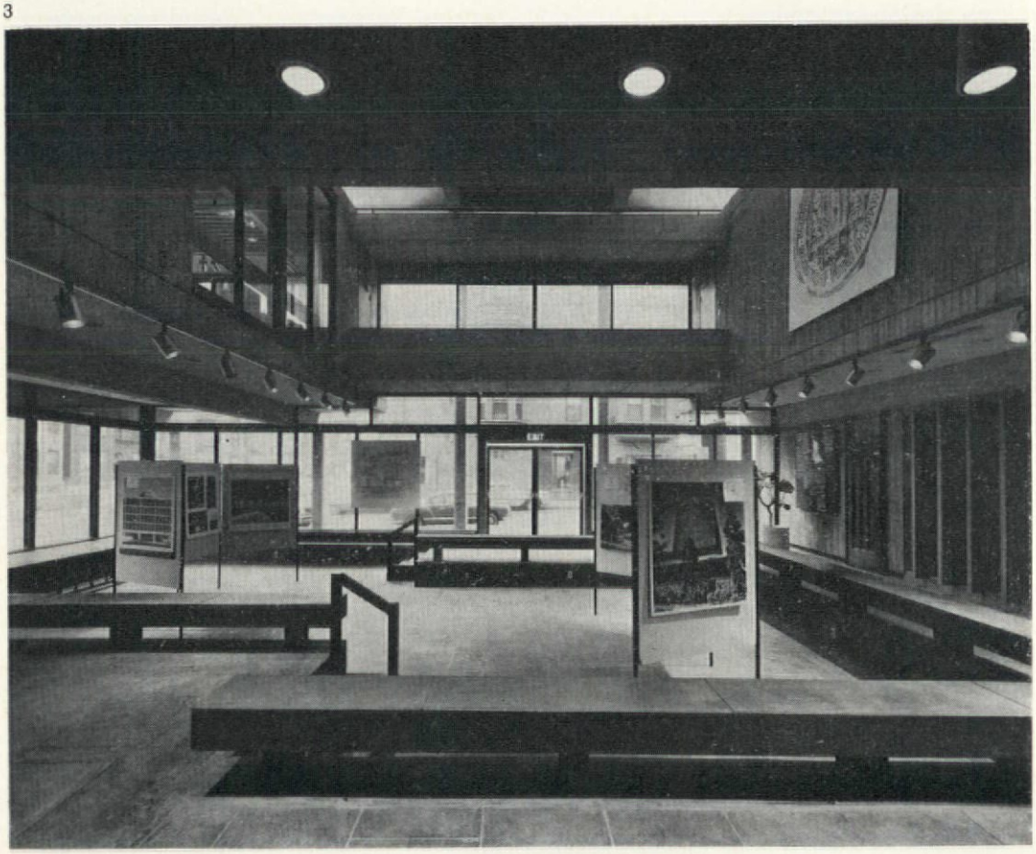

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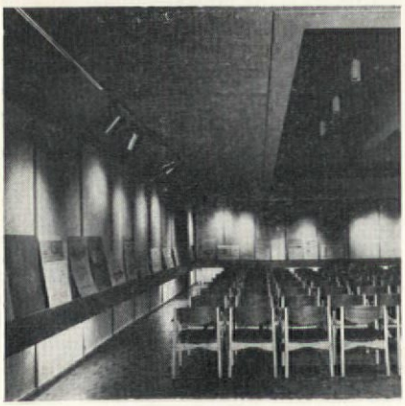
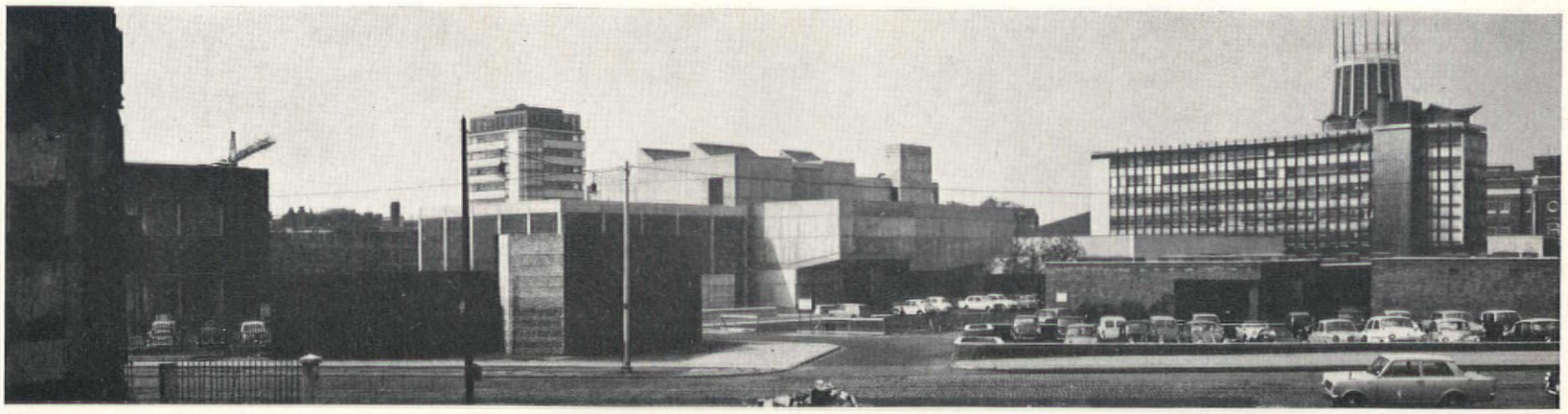


5

1
Stairway, rough board shuttered and sand-blasted concrete finish
2
Court on the fifth floor
3 & 5
Views of the exhibition area in the main entrance foyer
4
Meeting room on the first floor
6
Oak-panelled memorial library on the fifth floor retained from original building
Photos: 1–5 Louis Reens



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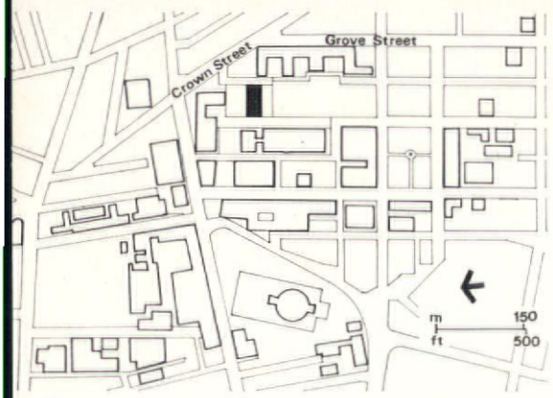

2

Science lecture theatres, University of Liverpool

Saunders, Boston and Brock

Associate architect: Robert Gardner-Medwin
Structural engineers: W. G. Curtin & Partners

1
View of the building from Crown Street, with the mathematics building on the left and the Metropolitan Cathedral crown emerging above it
2
Layout of the university precinct
3 & 4
Views of the building from the SE and the north, indicating the variety of buildings, by a variety of architects, that make up the precinct
Photos: 1, 3 & 4 John Mills

Accommodation includes four lecture theatres (350, 250, 150, 85), a mathematics reading room and a suite of rooms for the Dean of the Faculty of Science and his staff.

Access to the four theatres is from a centrally-placed foyer on the first floor, approached by a grand stair.

Below the foyer is the mathematics reading room, and above it, accessible from a separate entrance with a lift, the Dean's suite. The lift provides level access to all the theatres for handicapped persons.

Also at this upper floor, above the back of the foyer, is the plant room, located to provide the shortest possible ventilation duct runs. UGC cost limits did not permit the installation of an air-cooled conditioning system, but to allow for

3

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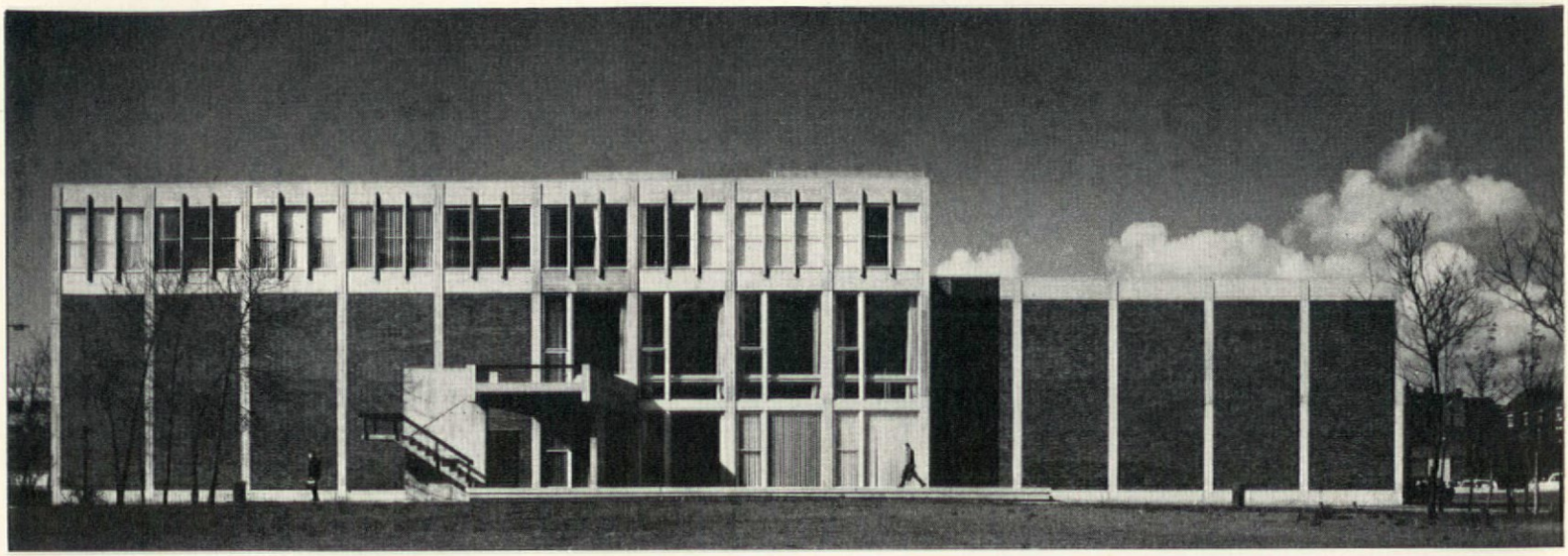

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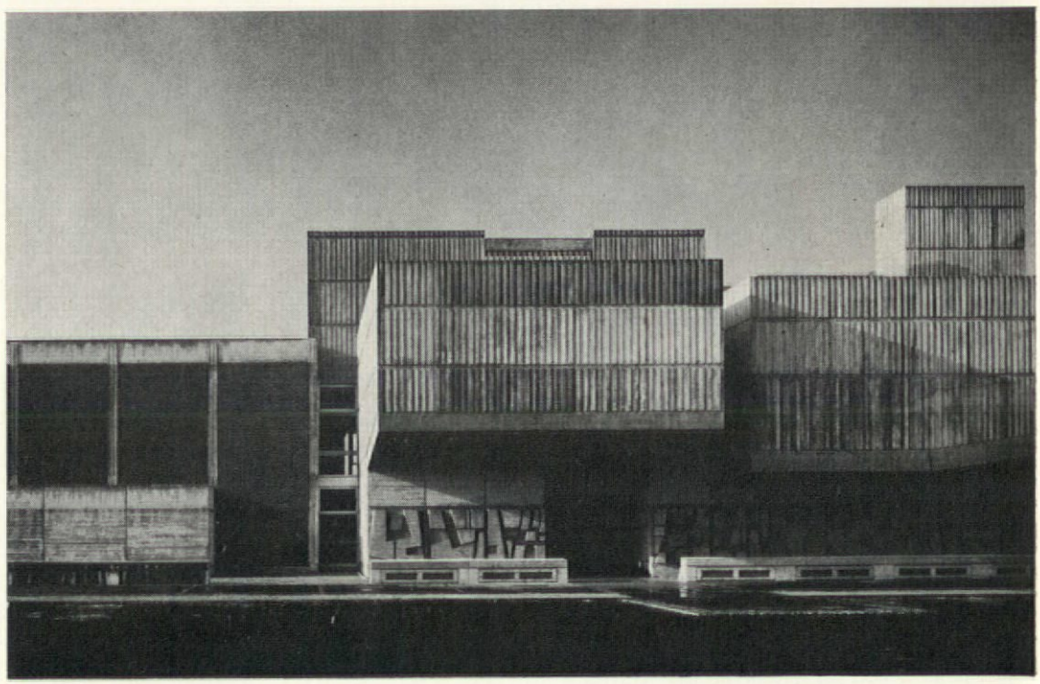


3

improved environmental standards in the future, a screened bay on the roof provides space for installation of a cooling tower, and an external hatch above the basement enables refrigeration plant and air-cooling tubes to be lowered into spare space adjacent to the calorifiers. Hot water heating is from a central source in an adjacent building.

Steel columns and trusses proved to be the most economical structural solution for the large theatres, but nearness to the railway cutting prompted the use of cantilevered reinforced concrete construction for the smaller theatres.

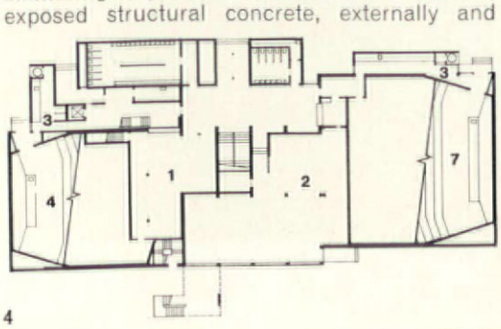
Great care was taken in the preparation of shuttering to produce the textured surfaces of exposed structural concrete, externally and internally. On the northern entrance side, the sculptor Fred Bushe collaborated in forming bold relief cast concrete panels at eye level.

Combined steel frame and reinforced concrete construction. Floors of pre-stressed concrete beam construction with breeze infill blocks. Walls are of reinforced concrete with board-marked finish, or panels of 11in facing brick-work with fair-faced concrete block inner leaf. Interior walls are not as a rule plastered, but finished as board-marked concrete or fair-faced concrete blockwork, or lined with acoustic-profile timber strip. Suspended ceilings in the theatres are of plaster on expanded metal to calculated profiles. Floors are of hardwood strip, PVC tile, and rubber.

Each of the larger theatres has two walls finished in fair-faced concrete blocks, with the rear wall of acoustic-profile timber strip.

The two smaller theatres have two walls plastered and two walls finished with veneered plywood panelling. All theatre ceilings are plastered.

Full mechanical ventilation to the theatres is provided, designed for 80°F maximum internal temperature with local control in plant room. Separate mechanical ventilation is provided to the reading room and cloakroom. Heating to the entrance hall, foyer, reading room and second floor offices is by means of low pressure hot water to convector heaters.



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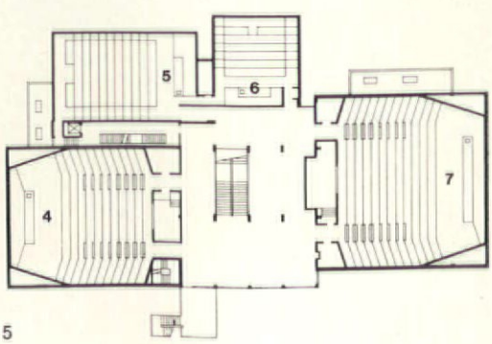

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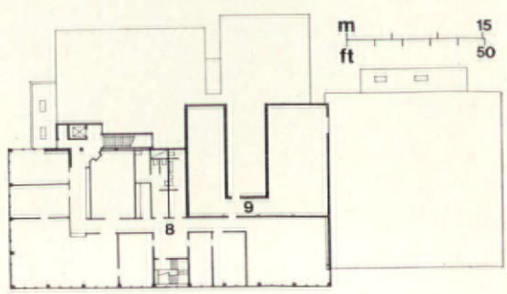

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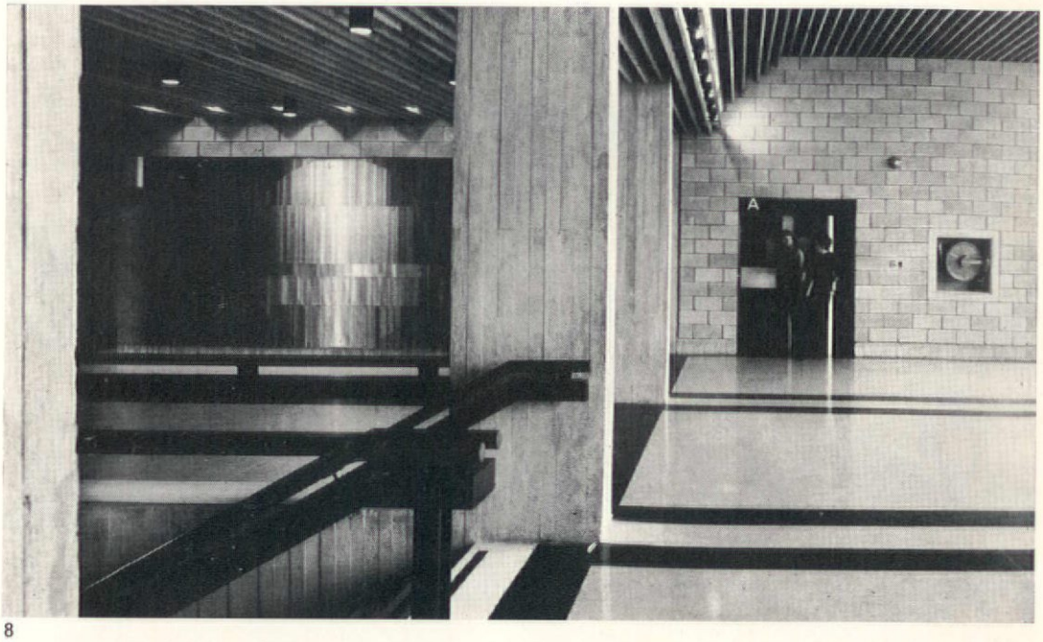

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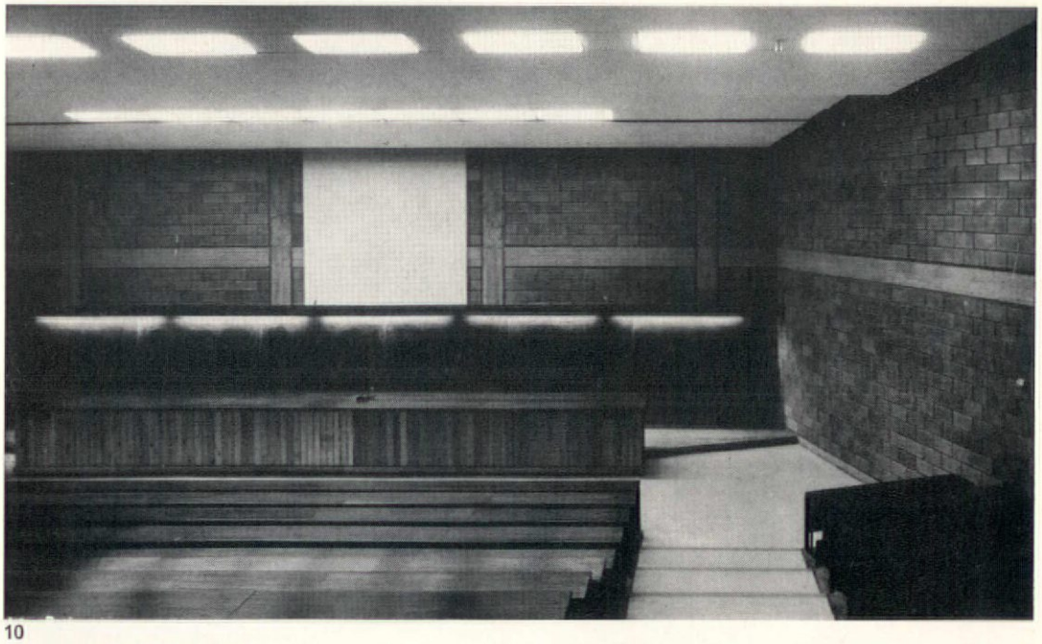


10

11

1
South elevation
2
North-west corner
3
Main entrance, north elevation
4, 5 & 6
Ground, first and second floor plans

1 cloakroom	6 85 theatre
2 reading room	7 350 theatre
3 preparation room	8 Dean's suite
4 250 theatre	9 mechanical plant
5 150 theatre	

7 & 8
Upper foyer and main stair
9 & 10
Lecture halls
11
Reading room
Photos: 1–3 & 7–11 Henk Snoek

Luigi Figini

Gino Pollini

Figini and Pollini*

Joseph Rykwert

Although they seem part of a heroic and remote period, Luigi Figini and Gino Pollini are now best known for a building which they designed between 1952 and 1954: a small suburban church in Milan, the Madonna dei Poveri. The heroic period started for them exactly forty years ago, when with Terragni, Fretti, Larco, Rava and Castagnoli (whose place in the group was taken by Libera at the end of 1927), they founded 'Group 7', which was later to grow into MIAR (Movimento Italiano per l'Architettura Razionale), the Italian branch of CIAM.

They were then both twenty-four, and both had just graduated from the school of architecture at the Milan Polytechnic. At that time Gaetano Moretti was still the leading figure in the school. But he was by 1927 a very old man; the great success of post-war building had gone to Piacentini in Rome and Muzio in Milan **3**.

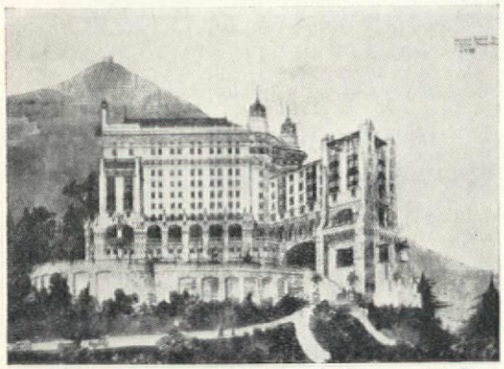
The *Novecento* has been amply chronicled elsewhere. At this distance it is a little difficult to appreciate that the modified and wilfully clumsy classicism of that particular manner should appeal to the speculators and the public authorities of the 'twenties, as well as to the Italian intellectuals of the period. It was, after all, the period of Perret's maturity, of the Bauhaus, of Corbusier's early work, and so on. But in Italy the *Novecento* was not discussed in the context of European developments: it was seen strictly in terms of what was happening locally.

The great European ferment was represented in Italian culture by the Futurists. Now in spite of all that we have heard about Sant'Elia and Chiattone, there has never really been any Futurist architecture. Sant'Elia himself, in spite of his brave patriotic prophesying and Marinetti's ranting assertions, was very much a fascinating by-product of Viennese developments, and had perhaps a closer affinity with a 'decadent' figure like Somarruga than he would have cared to acknowledge **1, 2**.

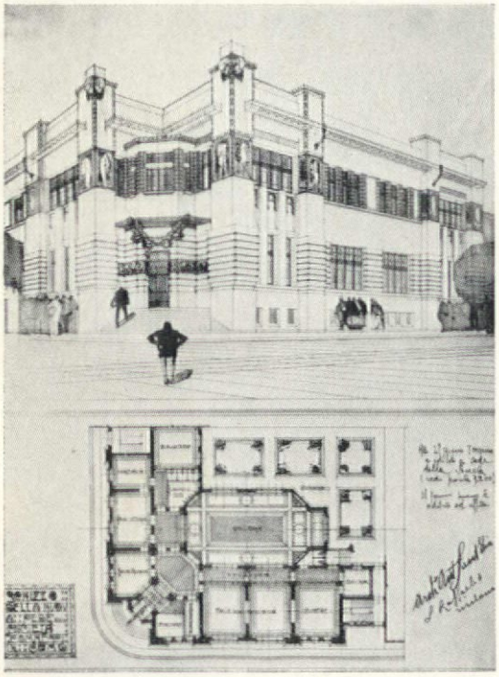
The 'twenties, therefore, the time when Figini and Pollini and their friends were students, were dominated by two explicitly nationalist tendencies: the superannuated, posturing, if sometimes brilliant, Futurists, whose influence on architecture was limited to the re-coining of some slogans; and on the other hand a successful bourgeois, isolationist, if sophisticated, neo-classicism. Neither of these tendencies appeared to the young men to offer a solution to the problems which seemed vital: neither tendency provided any consistent discussion of housing problems, for instance; the interest in industrial architecture was stimulated by the formal excitement that it might provide, not by its real possibilities. The new style for the new society had become a slogan which the Futurists went on repeating without being able to do much about it, while the Neo-classicists regarded all the ferment with a slighting and remote condescension **3**.

The aim of Group 7 was to detach the younger Italian architects from both tendencies. Their gospel was overtly—and at the time unpopularly—internationalist, or at any rate seemed so when seen from the Italian vantage-point. Their aims, however, now seem unexceptionable. An appeal against individualism, almost commonplace when considered in contrast to contemporary architectural writing, against eclecticism; in favour of reason, logic, order, a lucidity whose Hellenism would only be the archaism of a new period.

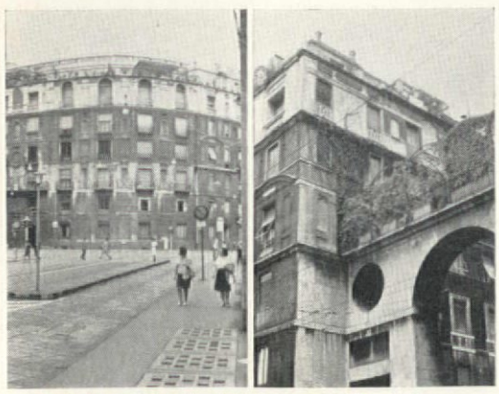
**See Cesare Blasi: FIGINI E POLLINI. Edizioni di Comunità, Milan 1963*



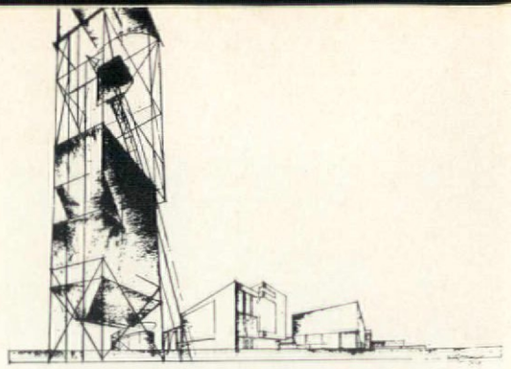
1 A Sommaruga, projected hotel, Campo dei Fiori, Varese



2 Sant'Elia, offices for the Società dei Commessi, Como, 1914



3 G. Muzio, Cà Brutt, via Moscova, Milan 1919



4 G. Terragni, design for a gas works, 1927

The work of the Group is more useful evidence of their enterprise than these rather generalized assertions. Terragni's gasworks **4** is a more prosaic attempt to include the paraphernalia of industrial production within the architectural framework than any of Sant'Elia's fantasies, and the very first project to which Figini and Pollini own up in a catalogue of their *œuvre* is a garage for 500 cars **5**. There is no earthy involvement of this kind with future problems in the whole of the Futurist corpus; but then, of course, the problem had not even presented itself before the first world war, and in 1927 even, such a garage would have seemed an improbable enterprise.

But in fact it was not until 1934 that Figini and Pollini were to become involved in a major programme of industrial building; there had been the small De Angeli Frua office block, Milan **6**, which they had done together with Baldassari in 1930–31, but for the rest their work was mostly housing and exhibitions. A small block of flats in the Via Annunciata, Milan **7**, in 1934 is in any case their only larger building of the period. But by far the most influential is the all-electric house at the Fourth Triennale (the last one to be held at Monza) in 1930 **8**. In many ways this now seems a somewhat naïve exercise. The open plan, the wide areas of glass, are standard features. The tiny top storey does not sit very happily in its place; the horizontal glazing bars and the quarter-curve window-pane are commonplace devices. In spite of the slightly jaded appearance it now presents, it was almost the first 'modern' house in Italy; after all the talk, it is the first attempt to present modern architecture on a domestic scale before a very wide public. Three years later, in Milan, Figini and Pollini produced a minor masterpiece in another exhibition house, House of the Artist **9–13**. The plan is approximately an H, with bedrooms and service rooms in one upright, the studio and the living room in the other, connected by an exhibition gallery. The two spaces between the uprights become screened and roofed courtyards, one of which is dominated by an early equestrian statue by Marino Marini, while the other has a swimming pool with a reclining figure by Fontana at the side. The interiors are

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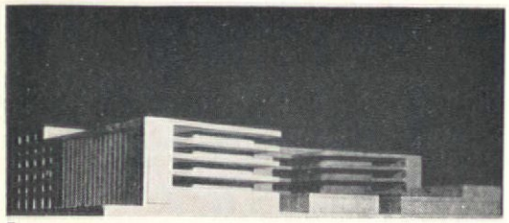
5
Parking garage design, 1927
6
De Angeli Frua office building, Milan, 1930–31 (in collaboration with L. Baldessari)
7
Apartment block, via Annunciata, Milan, 1934
8
Electric House, Exhibition of Decorative Art, IV, Monza, 1930
9–13
Plan, interior and exterior views of the House of the Artist, Milan Triennale V, 1933

1 studio	7 maid's room
2 living room	8 dressing room
3 study	9 bedroom
4 gallery	10 plunge pool
5 dining room	11 solarium
6 kitchen	

Photos: 12 Fortunati



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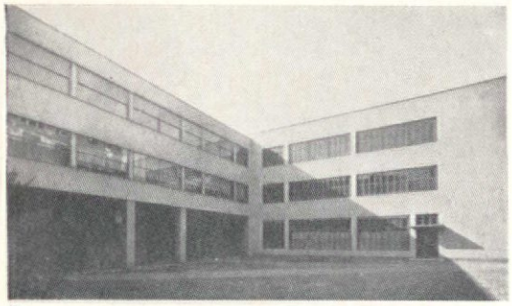

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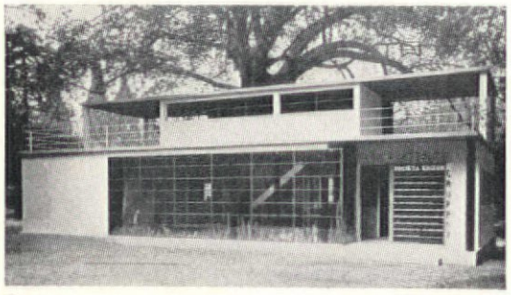

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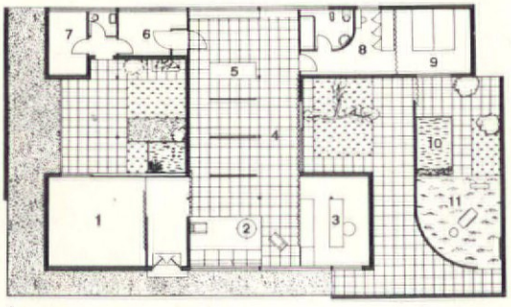

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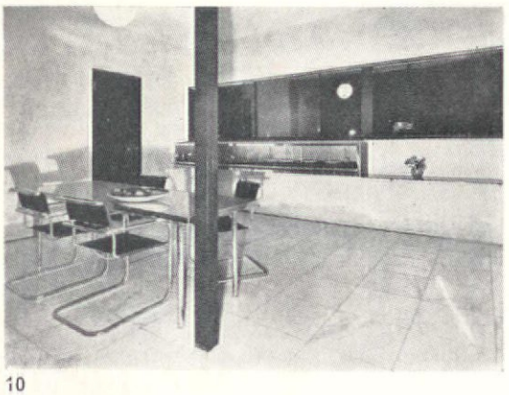

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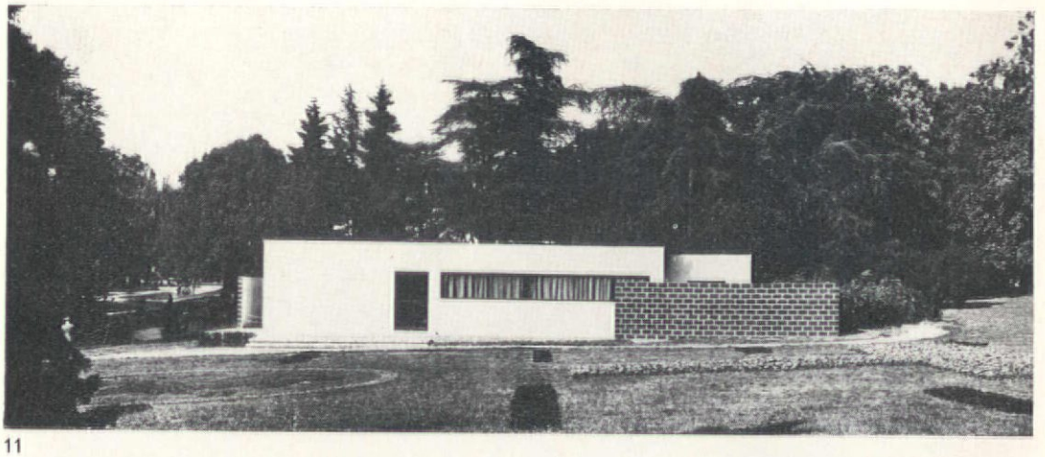

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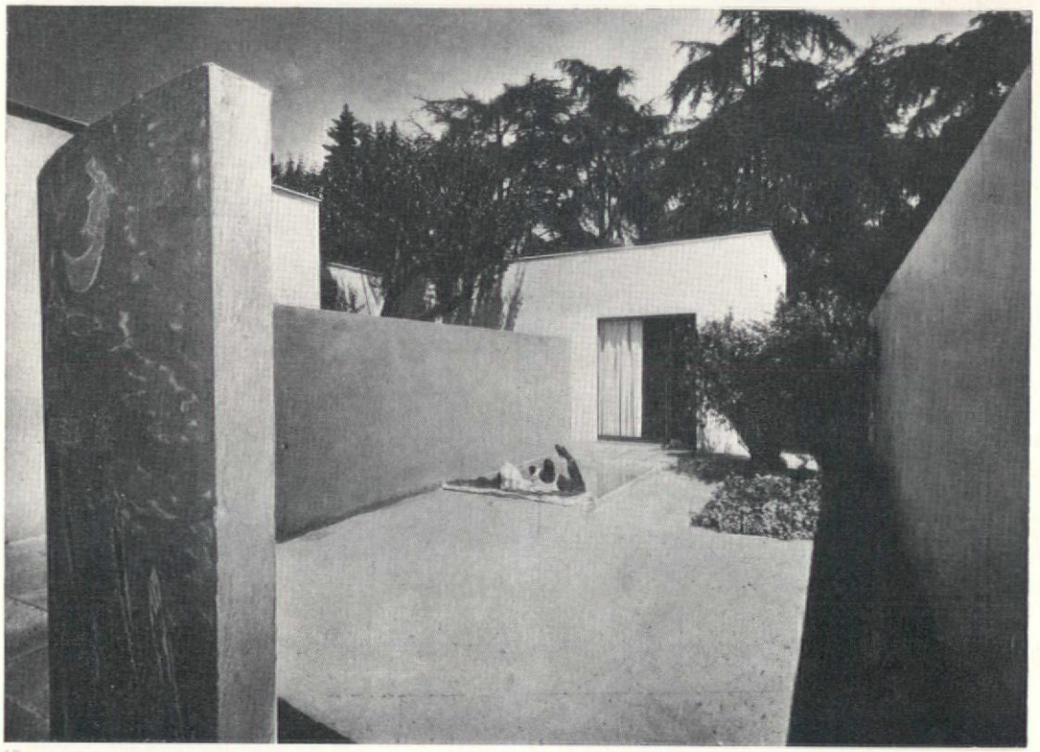

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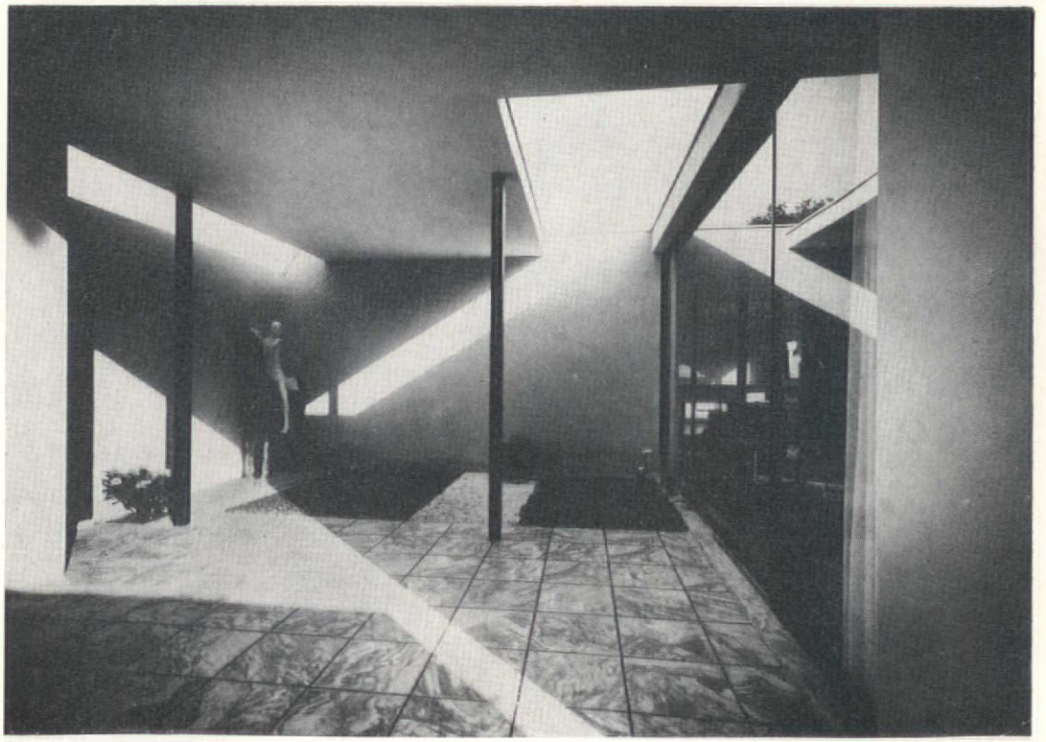

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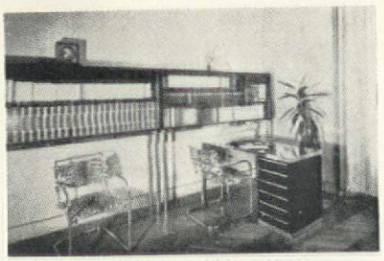
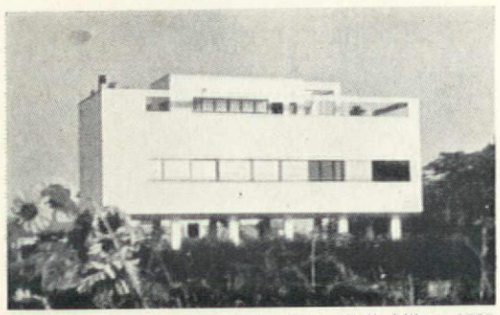
14 Ferrario dining room, Milan, 1936

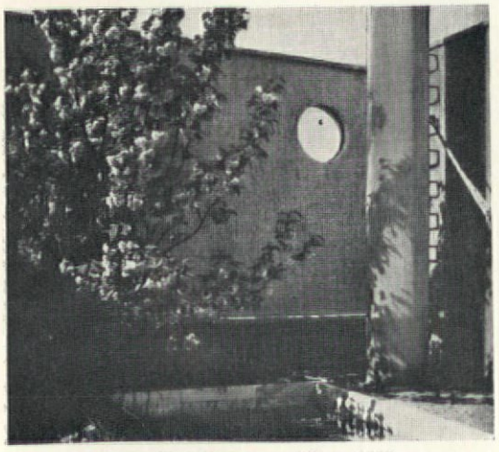


15 Mansuardi library, Milan, 1935



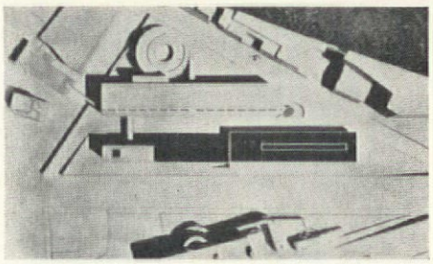
16 Figini's house, Villagio dei Giornalisti, Milan, 1935

17 First floor terrace, Figini's house, Milan, 1935

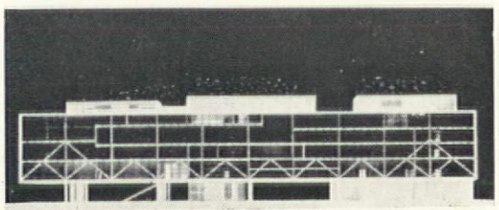


18 Roof terrace, Figini's house, Milan, 1935

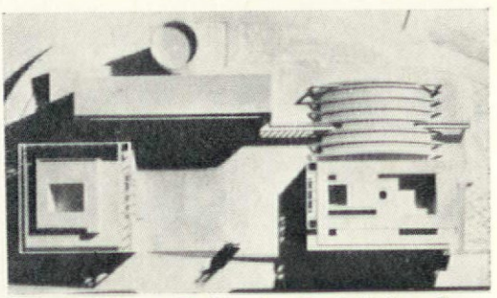
19 Room of the Precursors, Italian Aeronautics Exhibition, Milan, 1934



20 Palazzo Littorio, Rome, 1934 (in collaboration with Banfi, Belgioiso, Peressuti, Rogers and Danusso)



21 Project for the Brera Academy, 1935 (in collaboration with Lingeri and Terragni)



22 Armed Forces Pavilion for E42 Exhibition, Rome, 1938 (not built)

23 Olivetti stand, Fiera Campionaria, Milan, 1935

furnished in a way which was to become characteristic of all Figini's and Pollini's interior design until the last war. They used a great deal the cantilevered chair **14, 15** (Mies/Breuer/Stam?) and generally the chrome of the period. Black leather or leopard-skin upholstery, wood very sparingly, usually painted or stained a dark colour; horizontal storage elements similar to those that Breuer so much favoured. Altogether the manner is nearest to that of Breuer during the Bauhaus period; though the Italians gave it that slight extra weight (suggested by monumental and noble materials), which in turn implied a slacker tension between the spare, harsh volumes and the thin, fastidious furniture, than there ever was in a Bauhaus interior.

The culmination of their domestic work is Figini's own house in the Villagio dei Giornalisti Milan of 1935 **16–18**. It is a two-storey house, raised on enormously tall square-plan pilotis. Although the plan does not entirely conform to the Corbusier model (the kitchen and living rooms are downstairs and the bedroom up), it is something of a profession of faith on the architect's behalf. The duplex courtyard has aged remarkably well, particularly now the tree has grown to its full height, and the furniture, too, even though the gloss has gone, looks dignified, if almost cosy.

At the time when the house was being built, Figini and Pollini were working on three very different projects: the Room of the Precursors in the Italian Aeronautics Exhibition of 1934 **19**, the competition project for the Palazzo del Littorio Rome **20**, and another collaborative project, a building outside Milan for the Brera Academy, with Lingeri and Terragni **21**. The Aeronautics Exhibition project first: this was the first big exhibition to give full play to that airy elegant technique which has made Italian exhibition design famous. Figini's and Pollini's participation was limited to one section, with a ceiling formed of a photograph of cloud; huge panels of drawings reproduced in negative stood freely in the airy hall. The scheme for the Brera was done in partnership with their old friends Terragni and Lingeri at the time when the idea for moving the whole Academy out to the country had just been mooted; it consists of a long slab entirely glazed on the north side, with the internal structure exposed through the glass, while the southern wall is a sparsely slitted concrete membrane. The Palazzo Littorio, a competition project done with Banfi, Belgioioso, Peresutti and Rogers, and the Pavilion of the Armed Forces for the E42 Exhibition **22** (designed in 1938 but not built) were the only two large-scale schemes which involved Figini and Pollini in the rhetorical gestures of the Fascist régime. In fact in 1935 they had also designed a stand for Olivetti Typewriters at the Fiera Campionaria, Milan **23**, and the bulk of their work from then until the end of the war was to be concerned with that remarkable firm. This was to include a factory which, as things now stand, has been built in four stages (1934–35, 1939–40, 1947–49, and 1956–57). But the work was considerably varied, and included a project for a new development of Ivrea in collaboration with Adriano Olivetti; an infant school; an unexecuted project for a staff canteen; a housing estate; a welfare centre, with which they won a closed competition and which was built in 1954–57 **24–37**. During the difficult wartime period Figini, and Pollini were able to keep free of the political involvements in which some of their less sagacious or perhaps politically more naïve colleagues became entangled.

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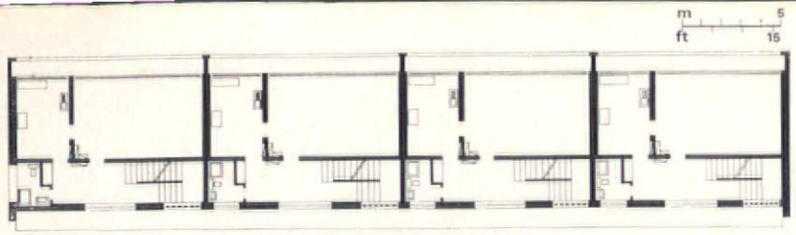
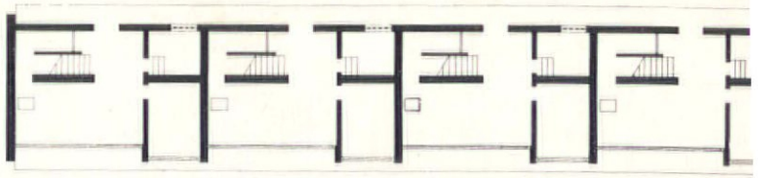
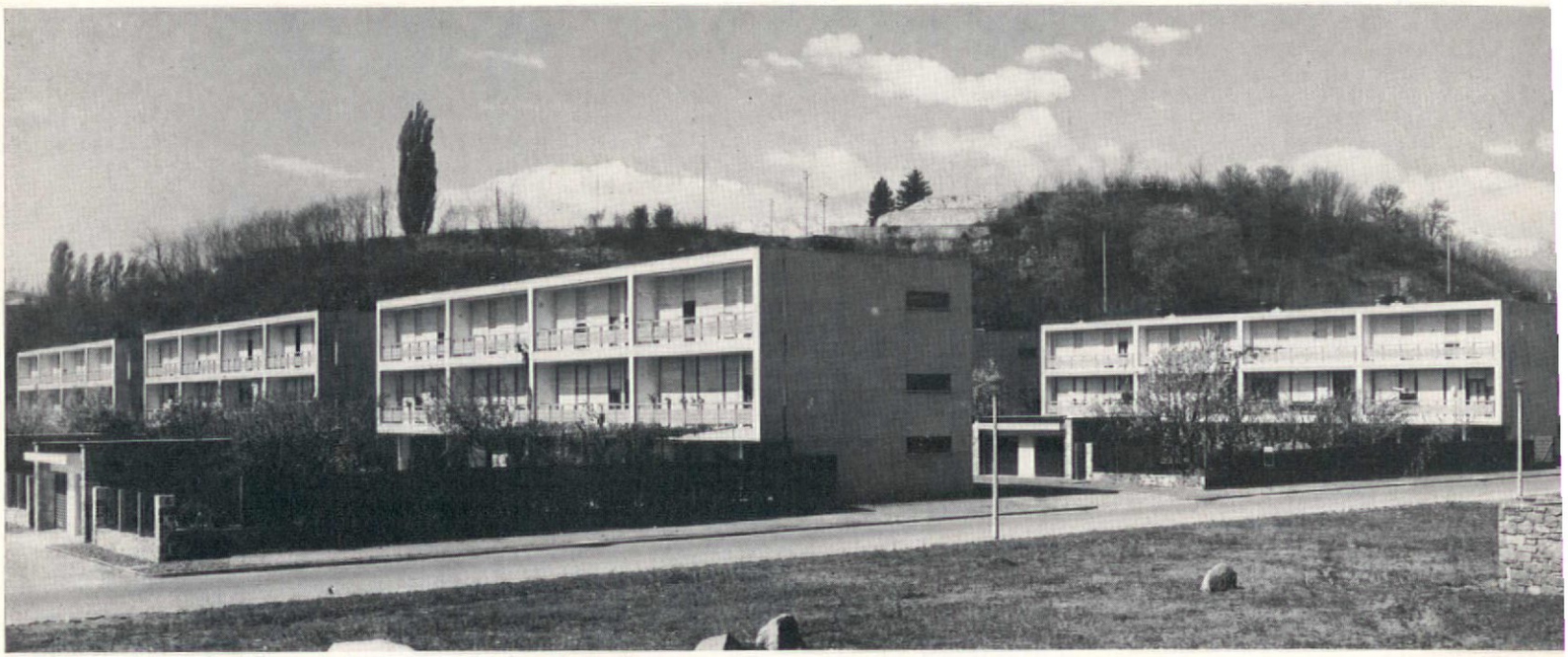


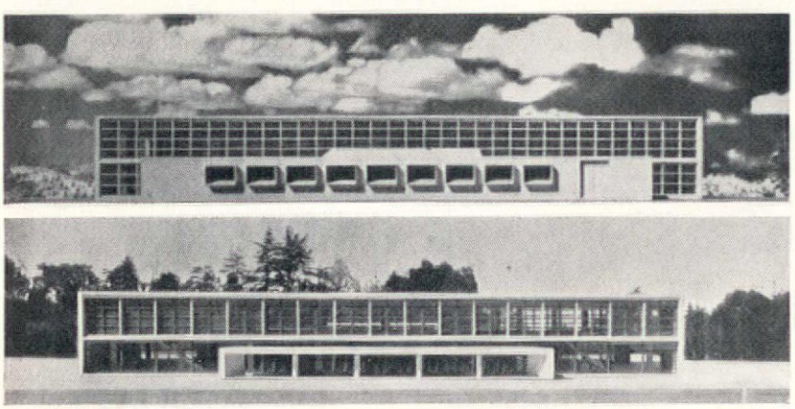
31 Staff housing, via Castellamonte, Ivrea, 1940—first floor plan



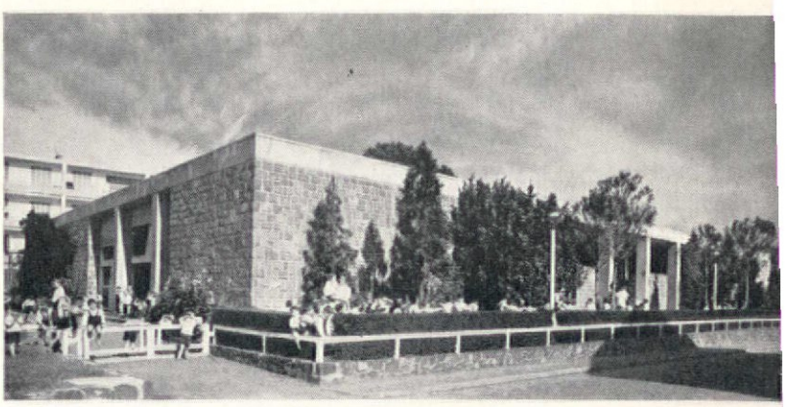
32 Staff housing, via Castellamonte—ground floor plan



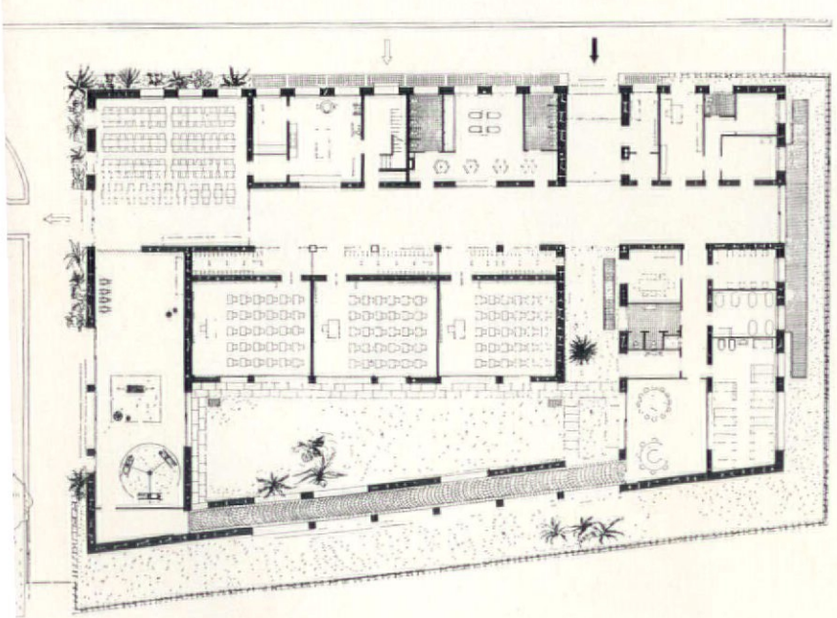
33 Staff housing, via Castellamonte, Ivrea, 1940—view from the south



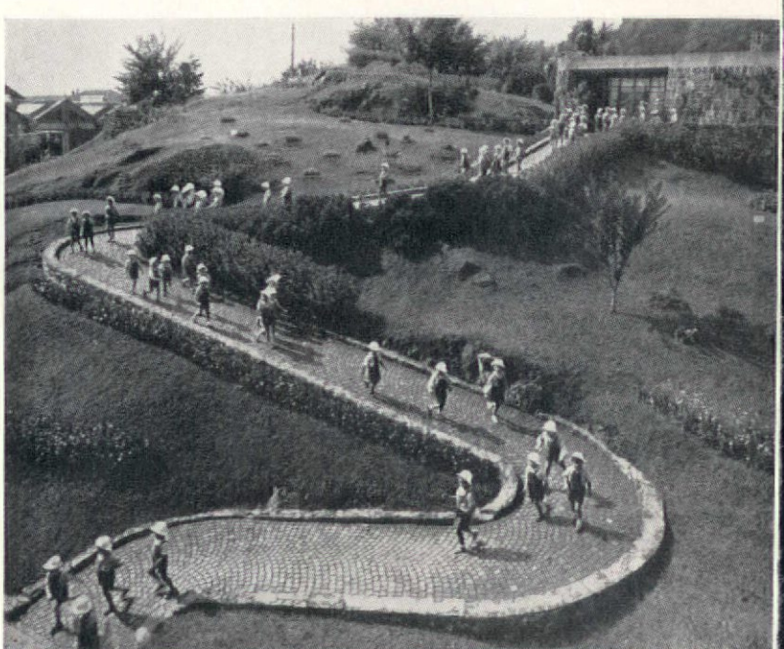
34 Projected Olivetti canteen, Ivrea, 1940



35 Nursery school, Ivrea, 1939–41



36 Plan of nursery school, Ivrea, 1939–41



37 Hill-top recreation building, related to the nursery school, Ivrea, 1939–41

/out of the Olivetti administrative and industrial ntre, Ivrea (buildings by Figini and Pollini in italics)

Olivetti offices
recreation
church and convent
canteen
stores and repair shops
ICO building
underground store
research centre
electrical sub-stations
technical services
personnel offices
12 garages
13 *Social Services building*
14 iron foundry
15 central plant
16 aluminium foundry
17 sanatorium
18 head office
19 *nursery school*
20 *staff housing*
21 parking

ffice building on the via Jervis, phase II, 1939–40

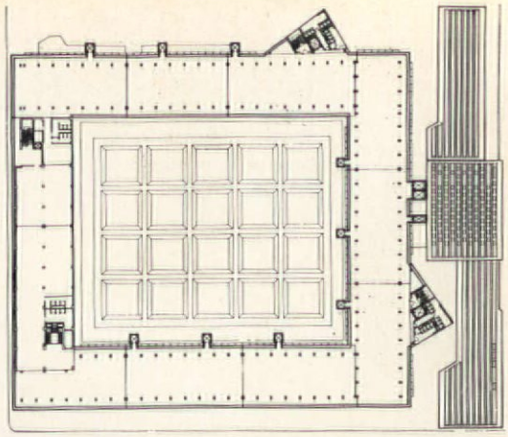
26
Typical upper floor plan of the ICO building, phase III and IV, 1956–57

27
South elevation of ICO building. Lift towers and walls of service areas are faced with ceramic tiles

28
First floor plan of the Social Services building, on the via Jervis, 1954–57

29
Night view along the via Jervis, with the Social Services building on the right

30
Portico of the Social Services building, opening onto the via Jervis



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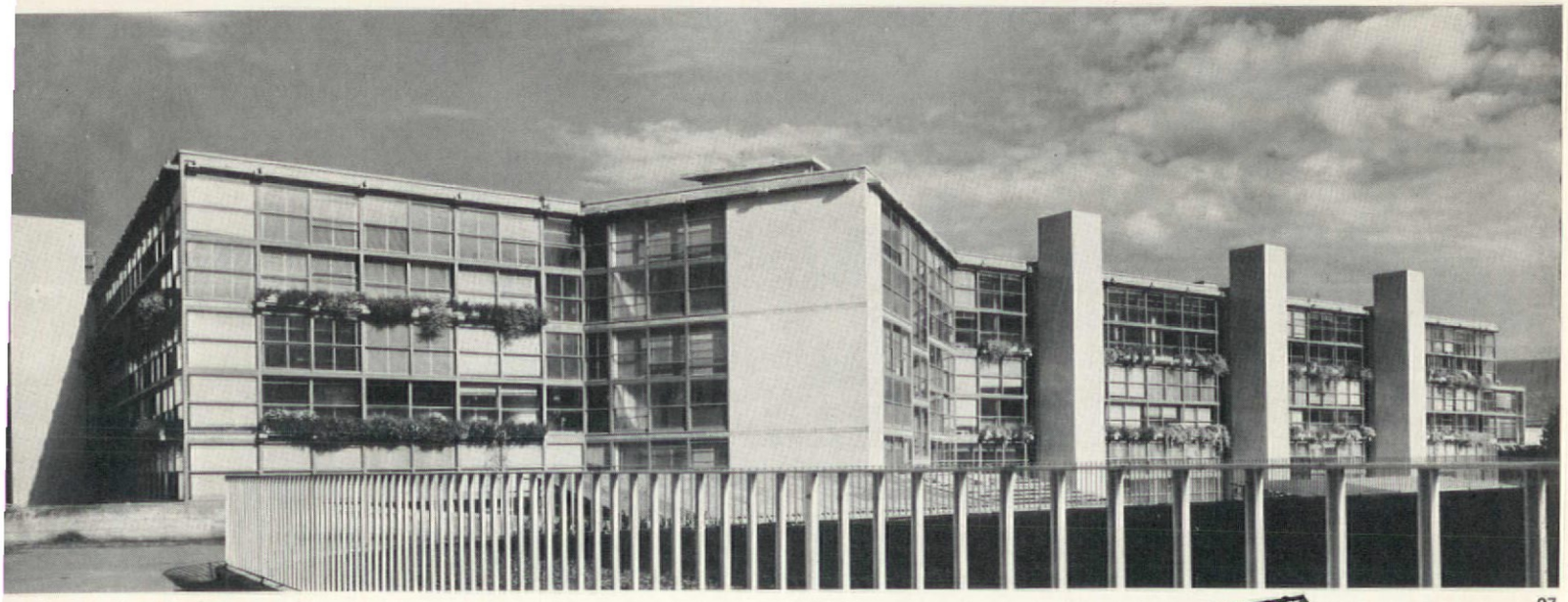

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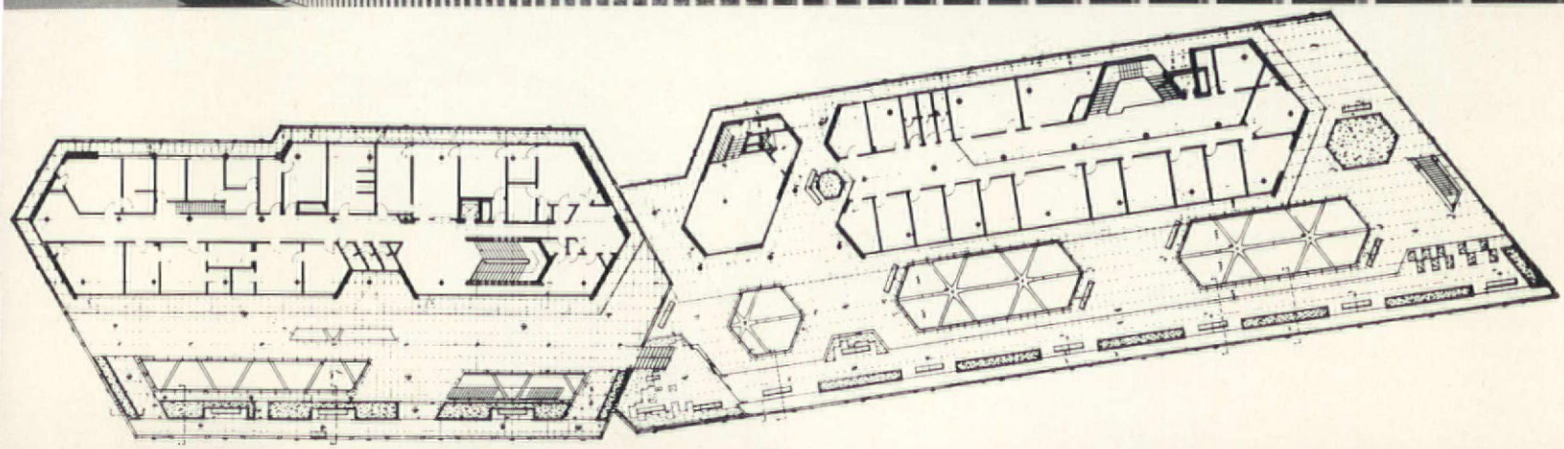

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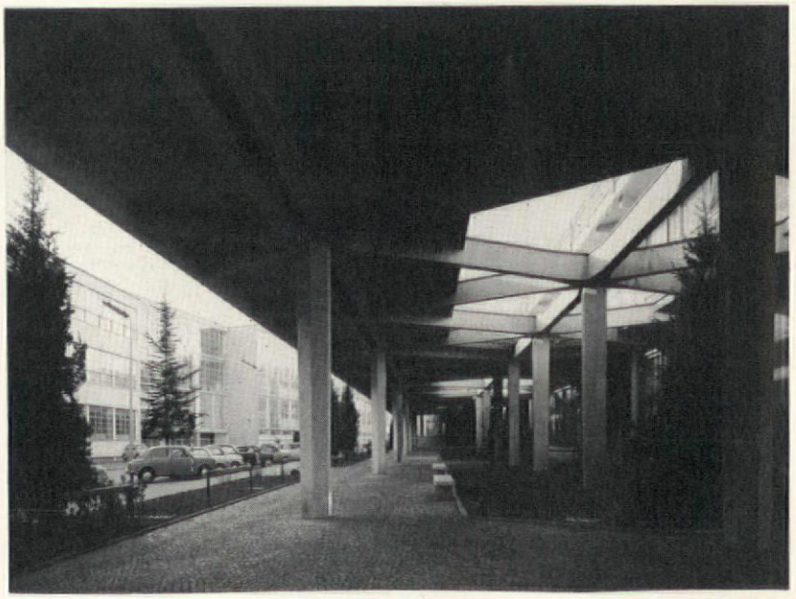

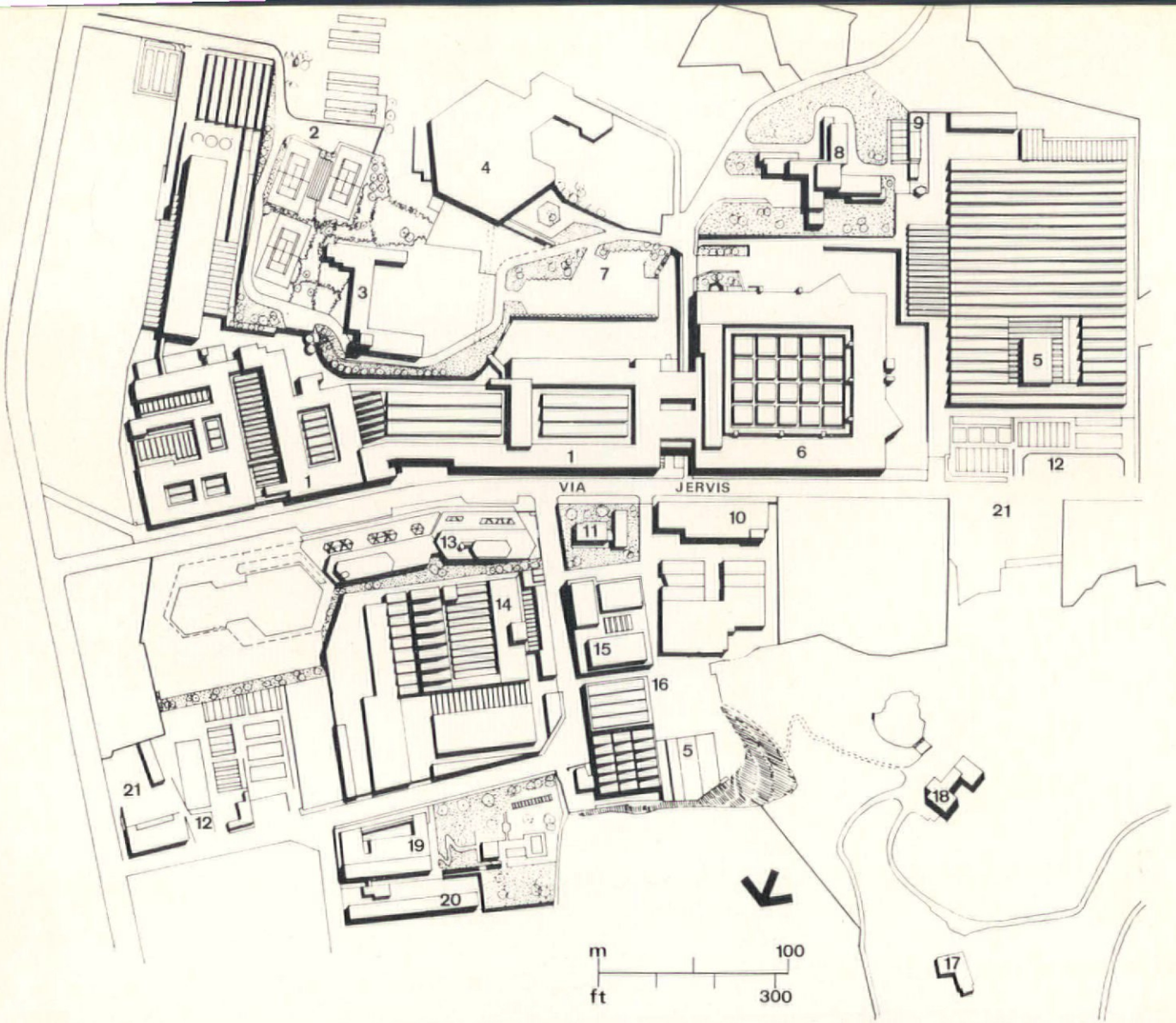
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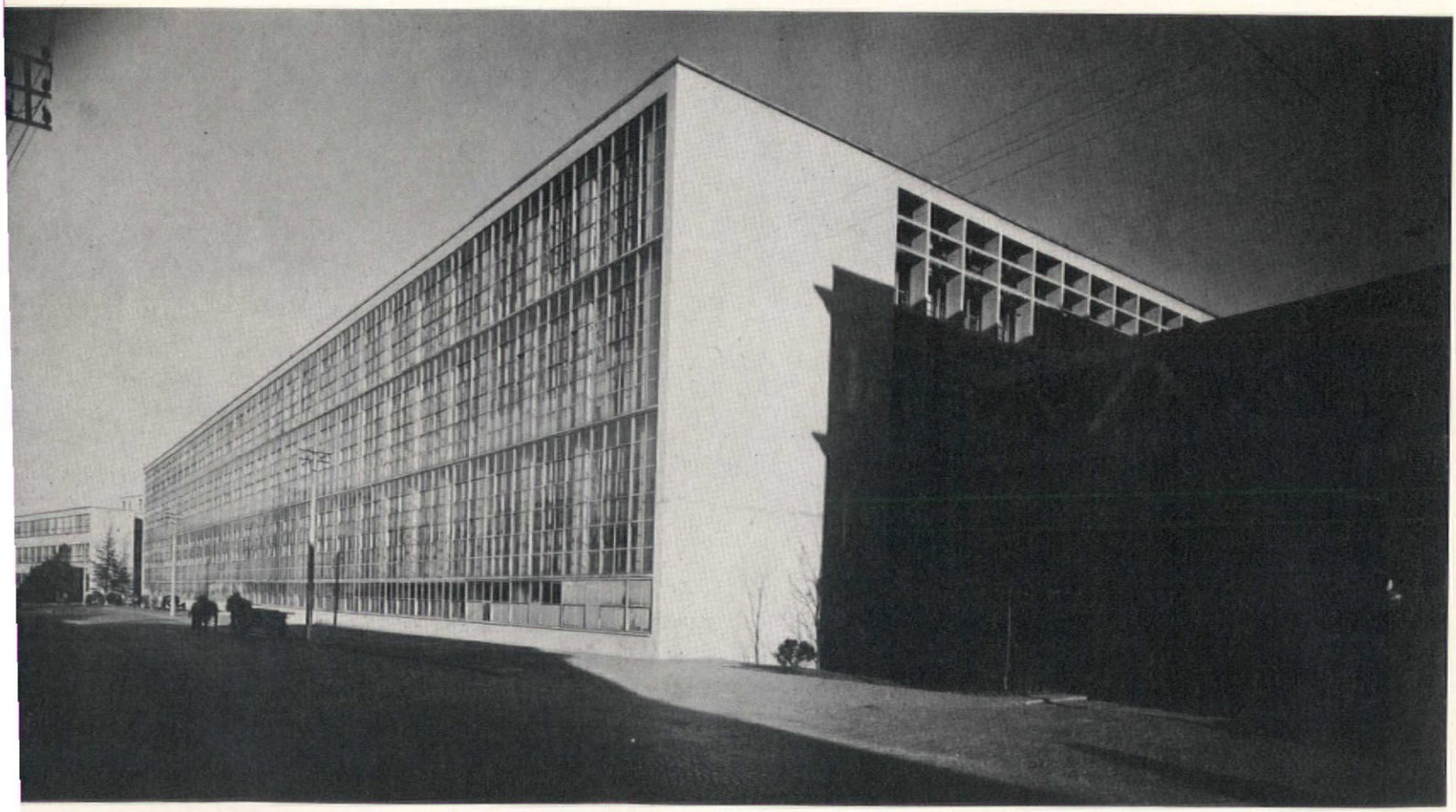
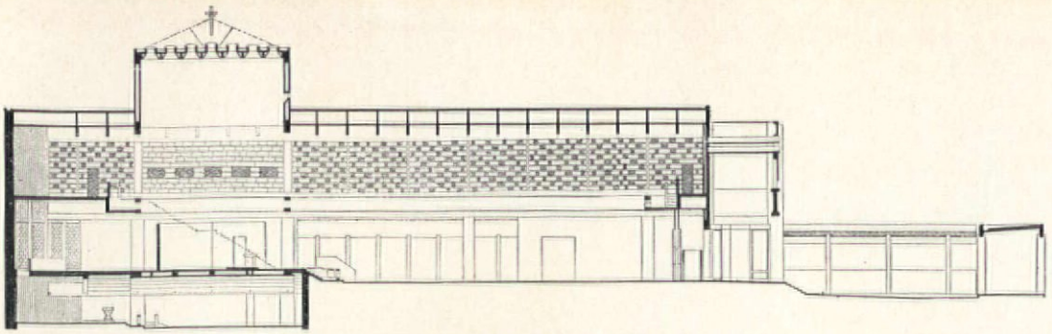
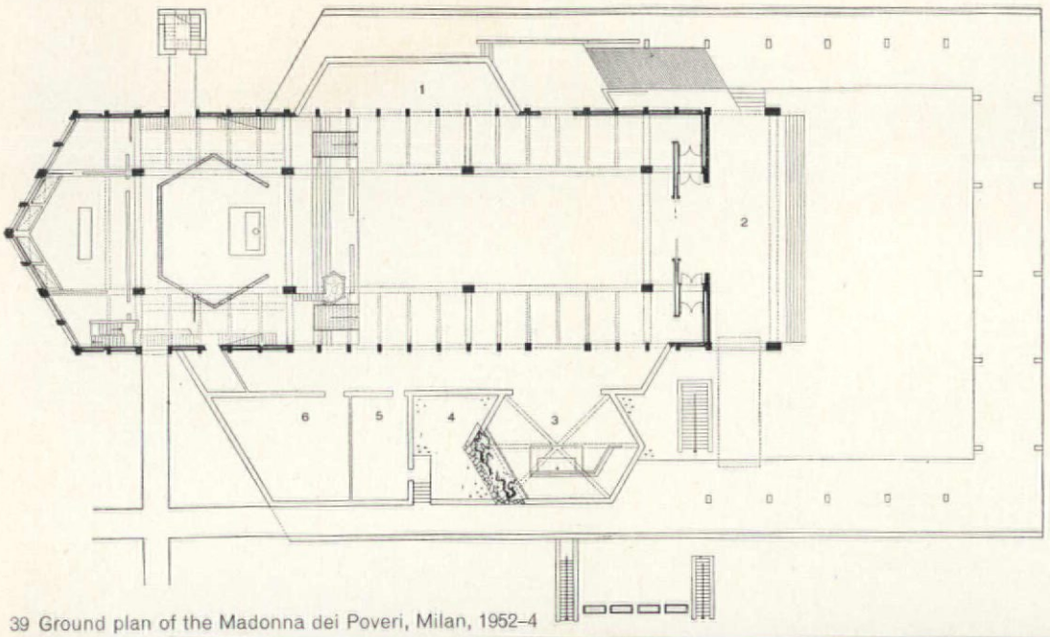
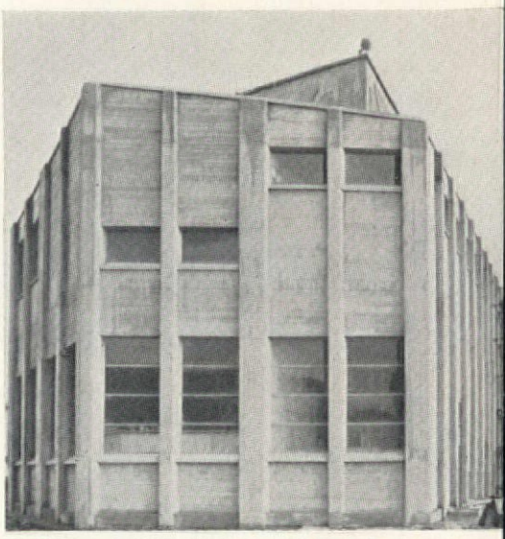




38 Longitudinal section through the Madonna dei Poveri, Milan, 1952–4



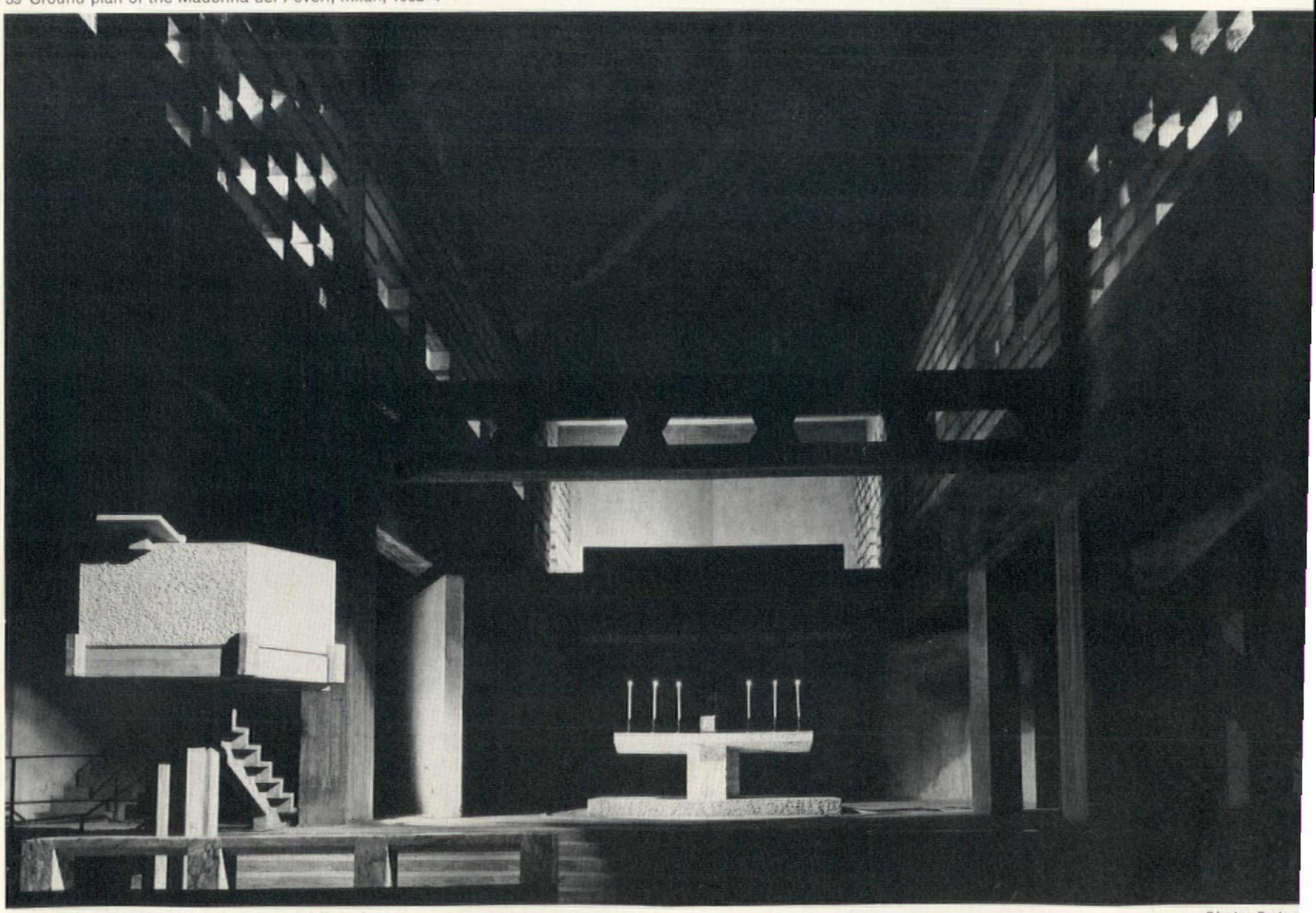
39 Ground plan of the Madonna dei Poveri, Milan, 1952–4



40 East end of the Madonna dei Poveri

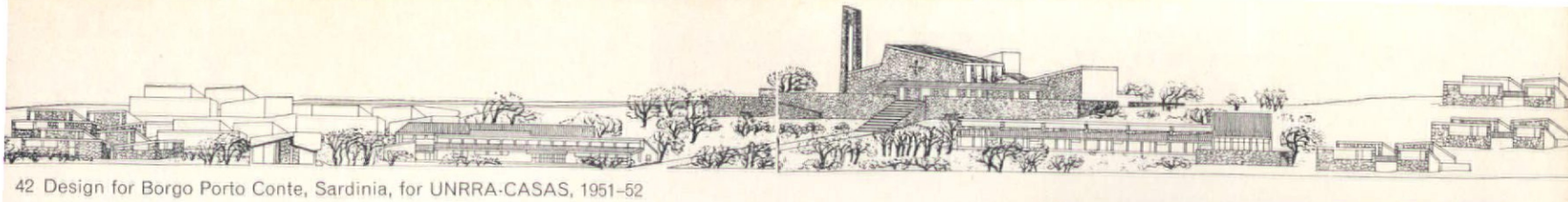
Key to church plan

1 confessionals	4 patio
2 narthex	5 office
3 chapel	6 store



41 View towards the altar, Madonna dei Poveri

Photo: Fortun



42 Design for Borgo Porto Conte, Sardinia, for UNRRA-CASAS, 1951–52

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In the meanwhile other commissions were increasing. Directly after the war there was a block of flats in the Via Broletto **44–46**, organized in two parts with a narrowish five-floor block on the street façade, and a nine-storey block in the gardens, the two connected by a courtyard which includes a ramp down to a covered garage and a garden over it. The Via Broletto block is a considerable refinement on some of the earlier schemes. The finish is made up of rather small stone rectangles of an uneven surface, and the modelling of the street façade is rather complex rhythmically, echoing perhaps some of Terragni's later buildings. However, the open structure is still that of the pre-war 'rationalist' commonplace; it is in the next few years that a definite change appears in Figini's and Pollini's production. There had been hints of it in the scheme for the Sardinian village of Borgo Porto Conte **42**, and even in the projected Villa Mansuardi, Cartabbia ten years earlier **43**. But the full impact appeared, appropriately enough, in the Madonna dei Poveri, the church which Figini and Pollini built in a suburb of Milan in 1952–54 **33–41**.

The dedication of the church and its location suggest a departure for the patronage of the Roman Church: whatever significance the Madonna dei Poveri may indeed have for post-war architecture, it certainly reflects the first welcome sign of change among the Italian higher clergy. The plan is that of a basilica of five long bays, of which three have so far been built; the construction is basically a concrete frame with either concrete or stone infilling. The nave is a long double-height space with single-height aisles surrounding it. At the upper (as it were clerestory—I am tempted to call it triforium) level, the gallery walk-round is supported from the upper part of the nave by a carefully spaced all-headers wall, with the stretchers left open to provide obscured lighting for the interior of the building; the exterior walls being partially closed. The chancel is a higher square tower with top lighting. This, of course, makes the church somewhat over-emphatic in a way eschewed by the liturgical movement, while at the same time the hidden sources of light, the somewhat melodramatic articulation of the space, may be taken to reflect the uneasy situation of the Roman Church in Italian society. Curiously enough, this quasi-mystical, introverted, slightly hand-made atmosphere of the interior is almost contradicted by the straightforward, if not altogether happy, treatment of the outside **40**. It is perhaps fortuitous that no photographs of the exterior appear in Cesare Blasi's monograph on Figini and Pollini; the building was in fact published in full in *Casabella* no. 208. The change of atmosphere is taken a step further in the block of flats built two years later

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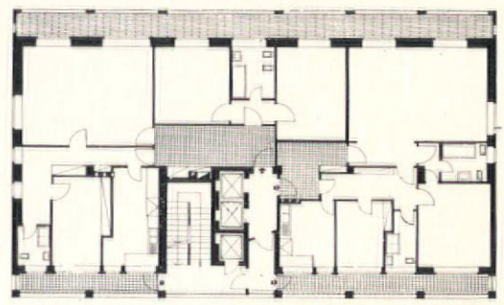
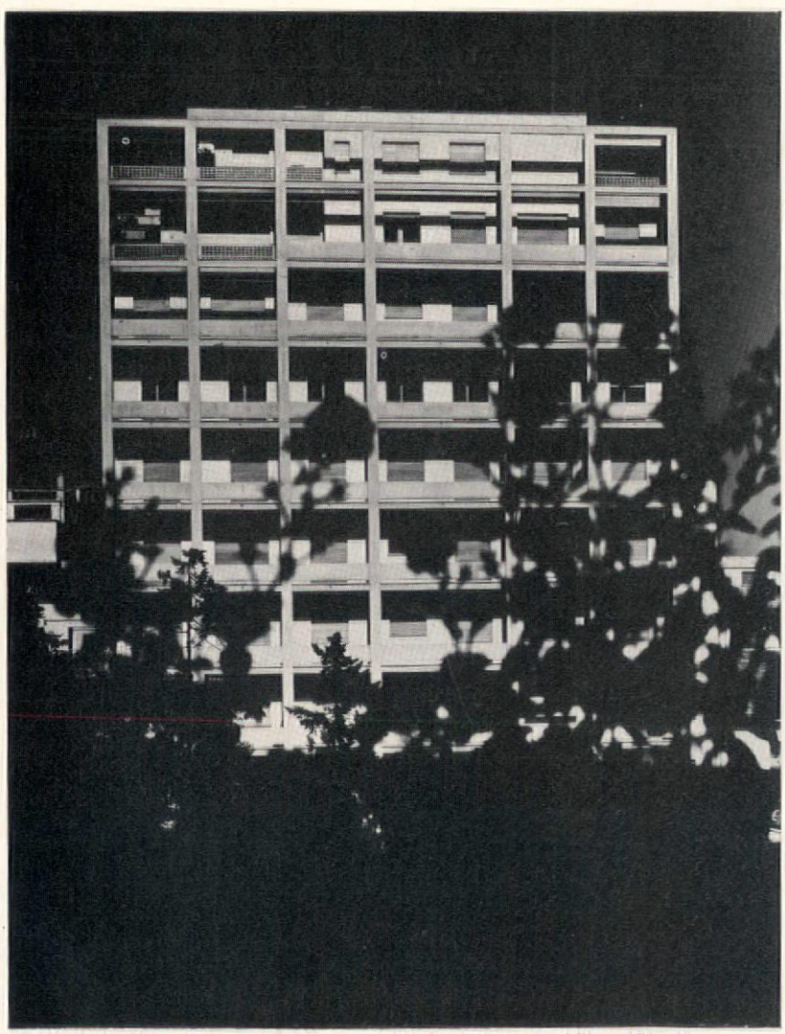
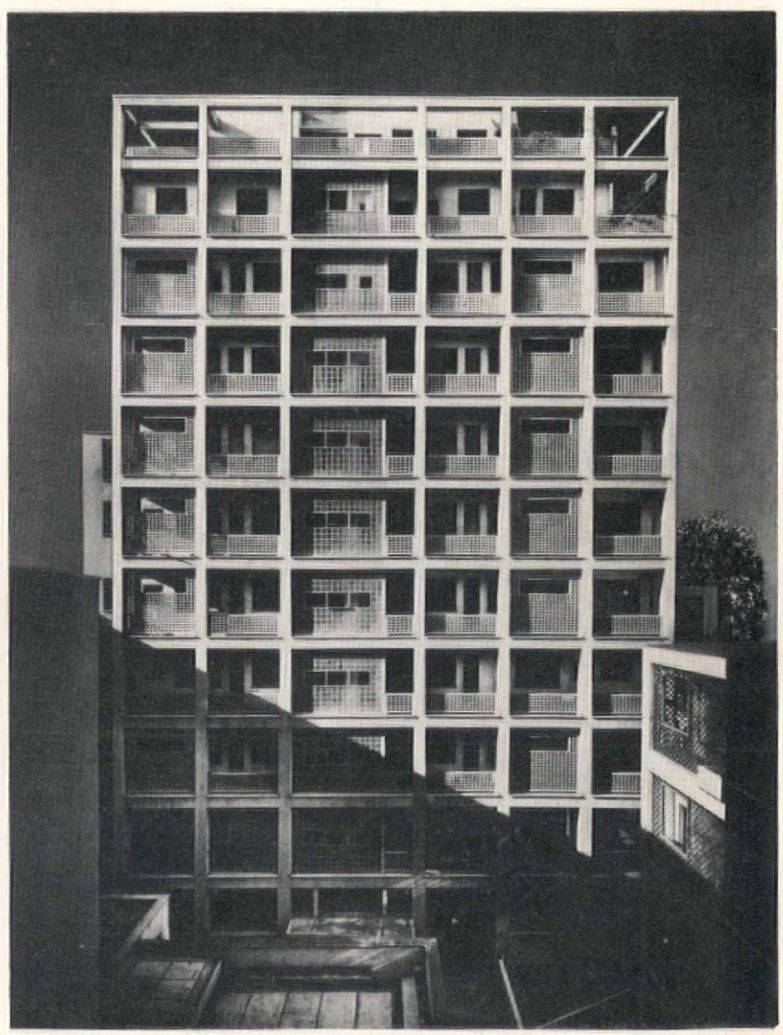
43 Design for Villa Manusardi, Cartabbia, 1942



44 Typical floor plan of the main apartment block, via Broletto, Milan, 1947–48



45 West elevation of the main apartment block, via Broletto, Milan, 1947–48



46 East elevation of the main apartment block, via Broletto, Milan, 1947–48
Photo: Fortunati

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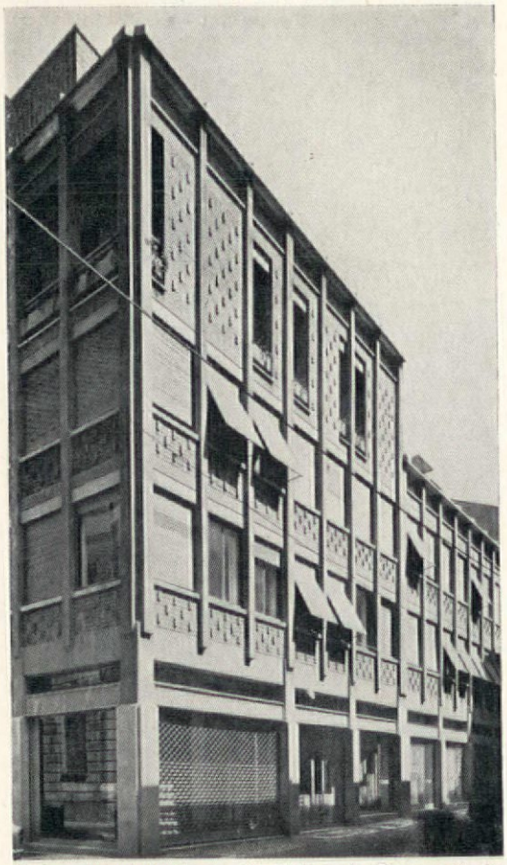
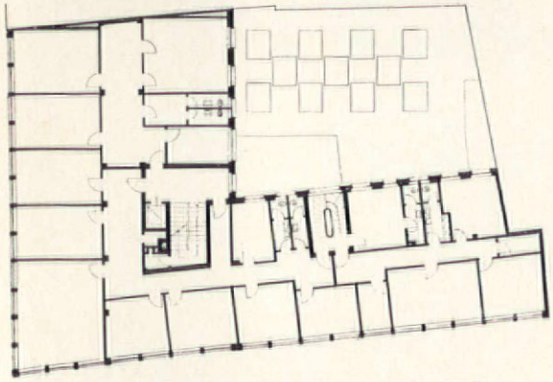
in the Via Circo **47, 48**. In this building for the first time Figini and Pollini turn back to the sort of analysis of the site they might have performed earlier, and accept the traditional light-well plan. The building is now divided into thin bays, and the infilling panels are partly glazing and partly an elaborate pattern of irregularly laid brick. Although two or three years later in the Via Hoepli, **49, 50** there is a return—a somewhat reluctant one, to judge by the earlier drawings—to former simplicity, in the latest work surface elaboration reappears: at its happiest in the factory and subsidiary buildings for the Pozzi ceramic works Caserta **55–60**; at its most constipated in the large blocks of flats which they are now building in the Largo Augusto, Milan **51**. The Pozzi factory is a large concern housed in separate pavilions grouped by trades: the paints and finishes works; laminates; and the actual ceramic works and powder products. The central zone contains the main entrances, the administration, and the changing rooms. The project also includes a scheme for a housing estate out of sight of the factory behind an artificial hill. The bulk of the building is in concrete construction; and although the finishes vary considerably, the basic infill is either exposed ceramic block or whitewashed pumice. On some buildings the roughly shuttered concrete is exposed in the now conventional fashion; since the construction is partly prefabricated, the almost self-consciously trabeated look has a good deal to be said for it.

Perhaps the most curious recent work, however, is the church for the CEP housing estate at Bergamo **52–54**. This has the incongruities of a late baroque plan, with a large cruciform central lantern over a stunted basilical crossing, and the altar beyond it in a lower bay: the whole church being divided into four pavilion-like bays, each one with its own trabeated system and roof structure. The echoes of Kahn are perhaps more clearly legible in the primitive scheme than on the final one, where the building appears more unified and the bays actually have pitched roofs. But altogether this is not a happy conception, and forms a slightly disturbing pendant to a very worthy *œuvre*. It is, however, not an isolated work: for Figini and Pollini, as for many architects of their generation, there is an almost inevitable association between orthogonality and rationalism. A departure from the orthogonal implies to them almost always an ambiguous attitude towards rational procedure in design. Figini and Pollini first adopt the hexagonal form in the Madonna dei Poveri, and they expand its use as a general grid form in the Olivetti social centre. In this last building there is, moreover, an attempt to create a more or less arbitrary variation of surface pattern in different areas of the building. It is perhaps worth reminding the reader that this building is contemporary with the beginning of the Neo-Liberty phase in Italy. Pattern is further elaborated in the Via Circo building, but here, as in all Figini and Pollini's work, the preponderance of the skeleton gives an overwhelming order to which the decorative detailing is subsumed. The emphasis on the rectangular structure finally disappears in the buildings of the 'sixties. In the Largo Augusto block, for instance, the pattern infill panels have exactly the same sur-

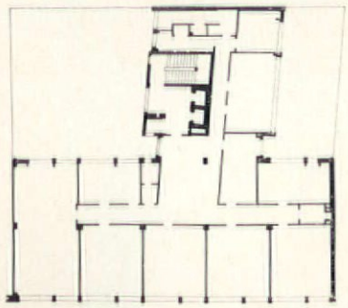


47 Apartment block, corner of the via Circo and via Medici, Milan, 1954–7

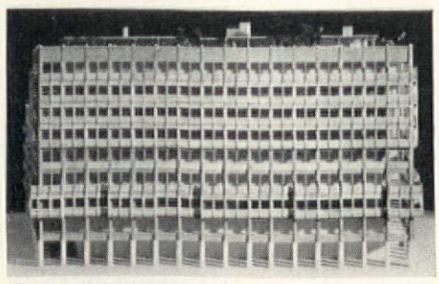


48 Typical floor plan, apartment block, via Circo, Milan

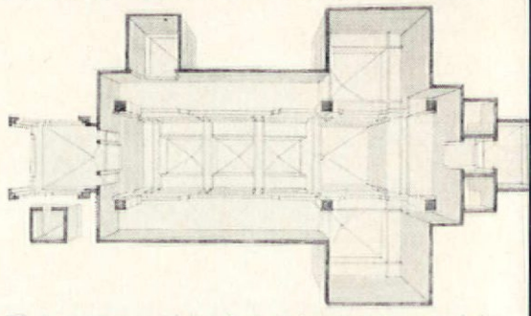
49 Façade detail, office block, via Hoepli, Milan, 1955–7



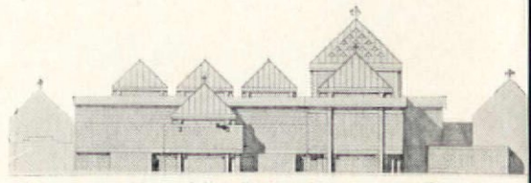
50 Typical floor plan, office block, via Hoepli



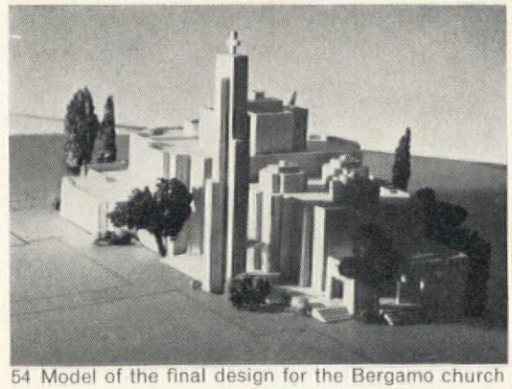
51 Model of hotel, largo Augusto, Milan, 1961–3 (in collaboration with C. Blasi)



52 Axonometric of the first design for the church for the CEP district, Bergamo, 1961–3



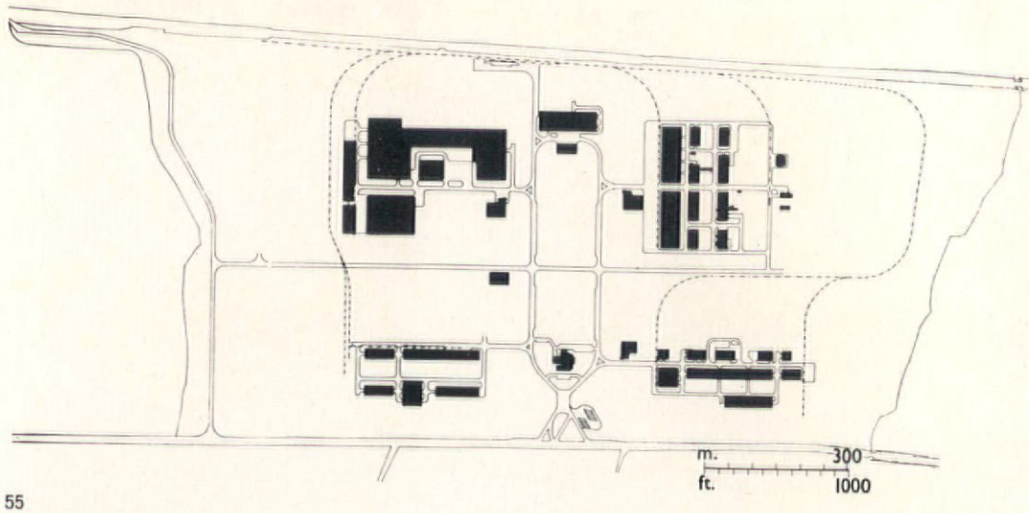
53 Side elevation of the first design for the Bergamo church



54 Model of the final design for the Bergamo church

face as the mullions, and the all-over pattern escapes the skeletal order which has always set bounds on Figini's and Pollini's capriciousness previously.

To the architects who grew up in the stringent discipline of early rationalism, the freedom and formal experimentation of the 'fifties and 'sixties were never wholly easy. The notional framework which the masters of the modern movement had bequeathed to the succeeding generation was rigid rather than strong, and it needed a certain intellectual toughness to expand the formal framework to accommodate the whole new world of ideas which has appeared more recently. Only the most remarkable have been able to achieve such a development. Figini and Pollini have not perhaps made any profoundly original contribution to the development of modern architecture. But they have always been aware of the live issues, and they have always dealt with a current problem in a way which displays at once their versatility and their intelligent involvement with the contemporary scene.



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55
General layout of the buildings of the Manifattura Ceramica Pozzi, Sparanise, near Caserta, 1960–3

56
Warehouse at the Pozzi ceramics works

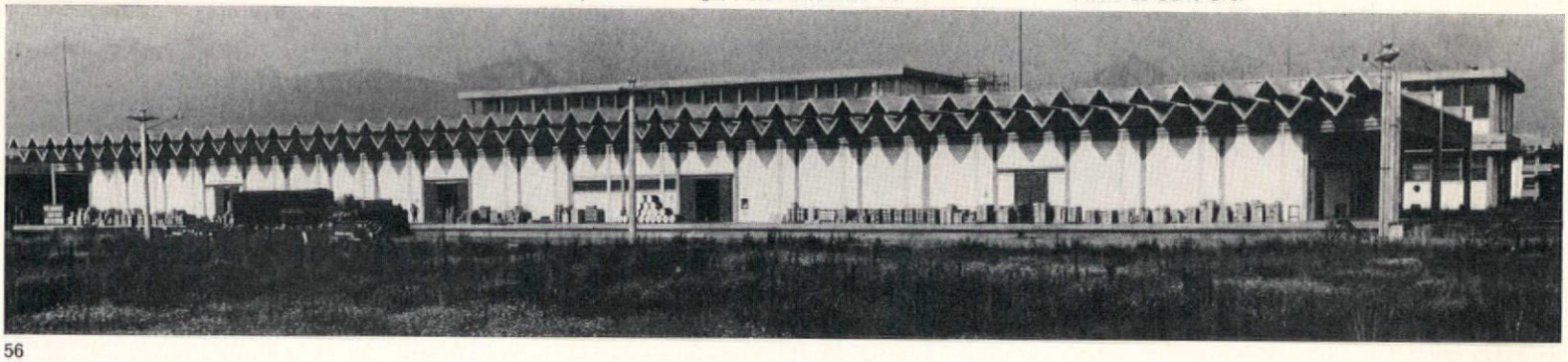
57
Despatch buildings, Pozzi ceramics works

58
Administration block, Pozzi ceramics works

59
Typical eaves detail of stores and factory buildings, Pozzi ceramics works

60
Interior view of roof lighting to stores and factory buildings, Pozzi ceramics works

Photo 56 *Carlo Orsi*



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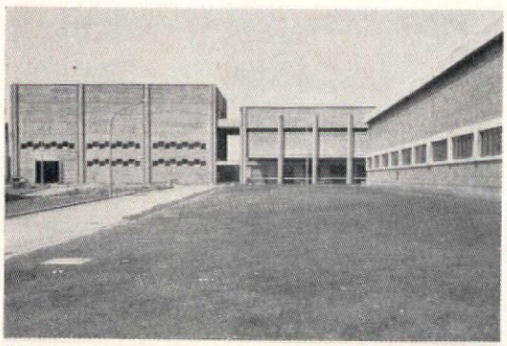

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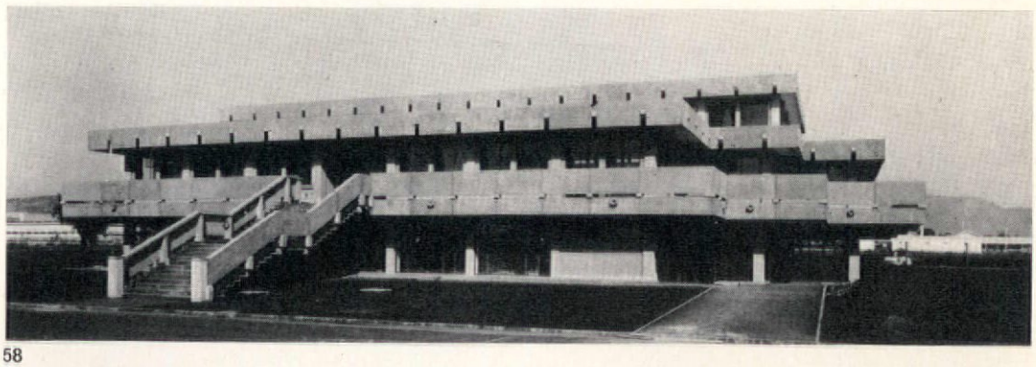

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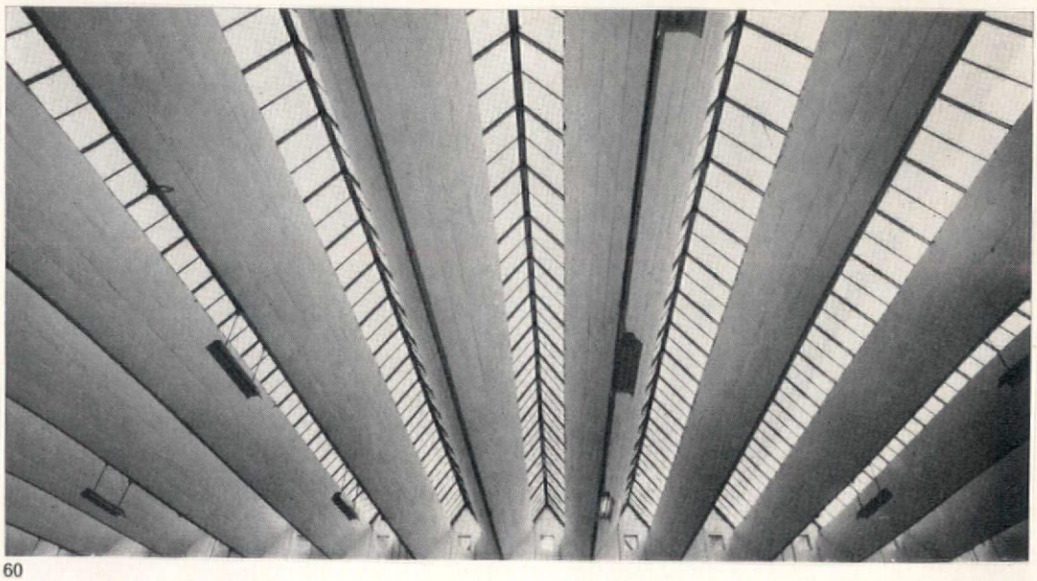


60

A research programme for a scientific method of planning

Yona Friedman

The city as a machine

A city could be understood as a mechanism facilitating contact between certain categories of people, and avoiding contact between other categories. Thus, the city is a 'communication regulator'.
If the city is such a regulator, it must be subject (like all regulators) to certain strict rules. In order to find out these strict rules, I shall use the image of the 'black box'. A 'black box' is, in cybernetics, a mechanism whose input and output are known, without knowledge of the process which takes place inside the mechanism. For the study of the mechanism we call 'city', the data (input) will be represented by the characteristics of the inhabitants' activities, and the products of the mechanism will be the configurations in space of the elementary volumes, as used for the different categories of activities.
In order to establish a parameter of efficiency characterizing the mechanisms thus defined, let us agree that we shall be able to measure the 'effort' deployed in the use of the mechanism (effort measurable by the movements of persons and merchandise). Of course, we can assume that the values tending towards a lesser effort could be considered the more desirable.
By using the terms thus established we will be able to conceive all possible notions of cities. Our next problem will thus be to study how to re-construct the city in terms of the parameters.
In order to succeed in this, I shall try to distinguish between the 'invisible' and the 'visible' parts of these mechanisms (In the above description of city mechanism, the 'black box' part corresponds to the invisible, or inobservable parts, while the inhabitants' activities and the volumes serving these activities correspond to the visible, or observable parts.)
This distinction between 'visible' and 'invisible' parts, related to the hardware city, could be expressed thus: visible parts will be called the elements *directly* utilized by the inhabitants during their activities (furniture, sanitary and electric equipment, partitions, shelters, vehicles, etc.); the invisible parts will be, on the other hand, the indirectly used elements (water networks, sewers, electricity networks etc.) These indirectly used elements (networks) we shall call 'infrastructure', and the directly used elements will be named 'fillings in the infrastructure'. Our programme will first consist of determining the infrastructure as a fixed network, and considering the 'fillings' as *mobile* fittings within the infrastructure.

The infrastructure

A hardware city is thus only an arrangement of 'fillings' within an infrastructure. The infrastructure can be conceived as three possible arrangements.:

1 Linear infrastructure: it forms a 'tree 'conducting commodity supplies (water, electricity, traffic, etc.). The fillings are arranged along this tree.

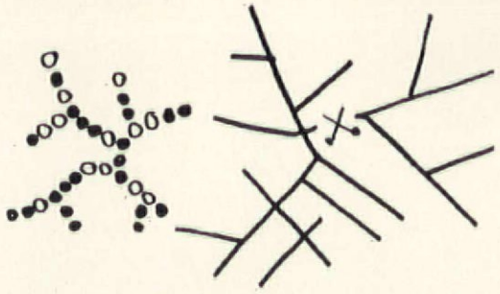
2 Planar infrastructure: it is a closed network in one plane, conducting commodity supplies. The fillings are arranged in the mesh of this network.

3 Spatial infrastructure: it conducts commodity supplies along a three-dimensional closed network. Fillings are arranged in the 'hollows' of this network.

In order to effect a choice between these infrastructures we must establish our criteria of preference:
On considering the number of possible variations of arrangement of fillings in each infrastructure, the most variations making the most use of the infrastructure should be considered advantageous.

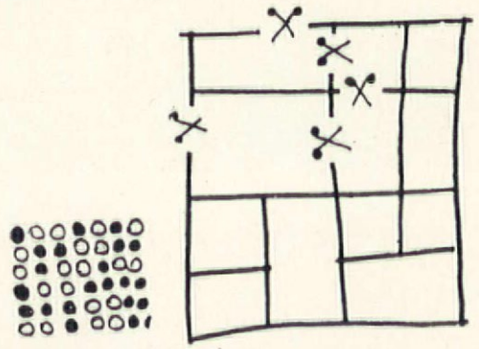
The number of cuts (breakdowns) in the infrastructure which can be allowed without separating one part of it from another and still permit its functioning, characterize the more efficient infrastructure.

According to these criteria:
The linear infrastructure allows less than 2ab variations for a surface a.b.



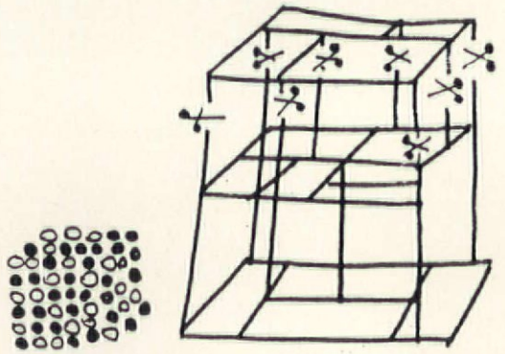
The linear infrastructure is put out of use by 1 cut (breakdown).

The planar infrastructure allows less than 2ab variations for a surface a.b.



The planar infrastructure is put out of use by 6 cuts (breakdowns) in average.

The spatial infrastructure allows less than 2 abc variations for a surface a.b.
(when c is the number of levels of the infrastructure).



The spatial infrastructure is put out of use by 12 cuts (breakdowns) in average.

Thus, the spatial infrastructure seems to be the most advantageous because it is both the less vulnerable to accidental breakdowns, and has the maximum variations.
The ideal form of the infrastructure would be an orthogonal three-dimensional grid: a packing of parallelepipedic volumes, represented by the hollows in the grid. Because of our actual context, the parallelepipedic volumes in the grid should be of two size categories, either volumes of small dimensions (for example, ranging from 25ft × 25ft × 9ft). These volumes (type A) will be used to contain activities implying a relatively reduced load (for example, the load for dwellings is about 10lb/sq ft, for offices 12lb/sq ft, etc.), or volumes of larger size, ranging from about 180ft × 180ft × 30ft (type B). These volumes will be used to contain activities implying heavy loads (for example: meetings, corresponding to 25lb/sq ft, traffic to 50–80lb/sq ft., industry, about the same weight, etc.).
Of course, the hardware infrastructure must permit various arrangements of these volume types.
Commonsense forces us, for a plausible solution, to group the volumes B (heavy weight) upon the ground surface. This choice implies the position of the volumes A (lightweight) arranged in layers over the layer of volumes B. In other words, the scheme of the spatial infrastructure represents an orthogonal three-dimensional grid, in which the large hollows would be in the lower layer and the small ones in the upper layers.
Such an infrastructure would take the form of a space-frame skeleton of multiple decks, with orthogonal empty volumes between the members. The skeleton itself would be lifted over earth-level on stilts, these stilts being located in the corners of the volumes B.
The infrastructure in this form can be made rigid either by reinforcement of the joints or by triangulation of the frame. Triangulation requires less material and fewer assembly operations. Therefore it is best to use a space-frame construction with rectangular hollows. This construction would be raised above-ground on widely spaced 'staircase-towers'. The space-frame construction must be triangulated in such a way as not to disturb the installation of both volume types A or B.

Urban mechanisms

After examining the possible organizations, the possible infrastructures and checking the feasibility of the most efficient one for existing technology, we meet a new problem: how do we *use* this infrastructure? How do we choose a pattern more efficient than other ones? To resolve this question, we need to find a new formulation of the definition of the concept 'city'.
We can thus consider a city as a set of obstacles (fillings) arranged in space (spatial infrastructure). Every used volume (dwellings, offices, stores, halls, etc.) can be considered as an *obstacle* for the free movement of the inhabitants of the city: they are obliged to *go around* these obstacles.
But these volumes are *not only* obstacles: they also represent the *departure points* or *targets* (terminal points) for the movement of inhabitants. We can say that any possible route of an inhabitant links a departure point to a target, and that any other volumes that the inhabitant meets on his route, are obstacles which he must go around. In other words, every volume in a city (dwellings, offices, etc.) is a departure point, or a target for a given number of inhabitants and it represents an obstacle for all other inhabitants at the same time.
The city, as a mechanism could be described as a labyrinthine configuration of departure points and target points, separated by obstacles.
This mechanism can be studied by observing the frequency of the movements of the inhabitants between departure or target points. The result of this observation will indicate the behaviour pattern of the inhabitants.
Here, we arrive at a very important conclusion: the sum of the movements in the labyrinth belongs to a dimension, which does not depend upon the configuration of the labyrinth, but upon the frequencies of

visits to certain 'addresses' (targets) of this labyrinth. This magnitude (number of steps necessary for covering all the routes times the frequency) will be larger in some cities than in others, thus establishing a *quantitative comparison* between any two urban mechanisms. I shall call this magnitude the 'numerical measure of effort' (over all effort of the inhabitants, deployed for the everyday use of their city). It is very important to add that this 'numerical measure of effort' is not determined in relation to the time necessary to cover a given distance, or to the exact distance to be covered. The principal use of the effort-parameter is to permit the *numerical comparison* between two urban mechanisms. Thus it helps the planner in his decision-making. For example (and only as an example) we shall be able to find out if an urban mechanism implying a lower effort value than another one, is or is not more efficient. At present we have no means of such comparison of urban mechanisms.
To make a model of such a mechanism we should need:

a a list of possible configurations of a set of obstacles in a limited field;

b a list of possible distributions of frequencies of movements between couples of such obstacles (here meaning departure points and targets);

c a calculation of the total overall efforts deployed by the inhabitants (individuals or groups) in their movements.

Naturally, such a model is extremely simplified, because we are not considering the psychological motives but only their observable results. In spite of this simplification, the model does not appear simple at all, it implies an enormous amount of work. The terms of the first two lists *a* and *b* (possible configurations and possible distributions of frequencies) are of finite number, but a fairly great number. We must thus further reduce the size of this model, in order to arrive at usable results. Thus we shall consider only the meaningful configurations (i.e. after application of certain constraints), and only certain frequency distributions. Low values will be considered as negligibles. These constraints will be chosen so that the lists to be constructed remain in the limit of the capacity of the computer which is supposed to construct this model.

Model of an urban mechanism

The task of the computer is that of a time-saving device and not that of one making decisions. The programme itself is a set of linear programmes which are not complicated mathematically. The only difficulty lies in the bulk of operations implied.
In other words, the model which we are trying to build is of the type of 'complete listing' instead of the 'optimizing' type.
Let us repeat now the necessary operations which

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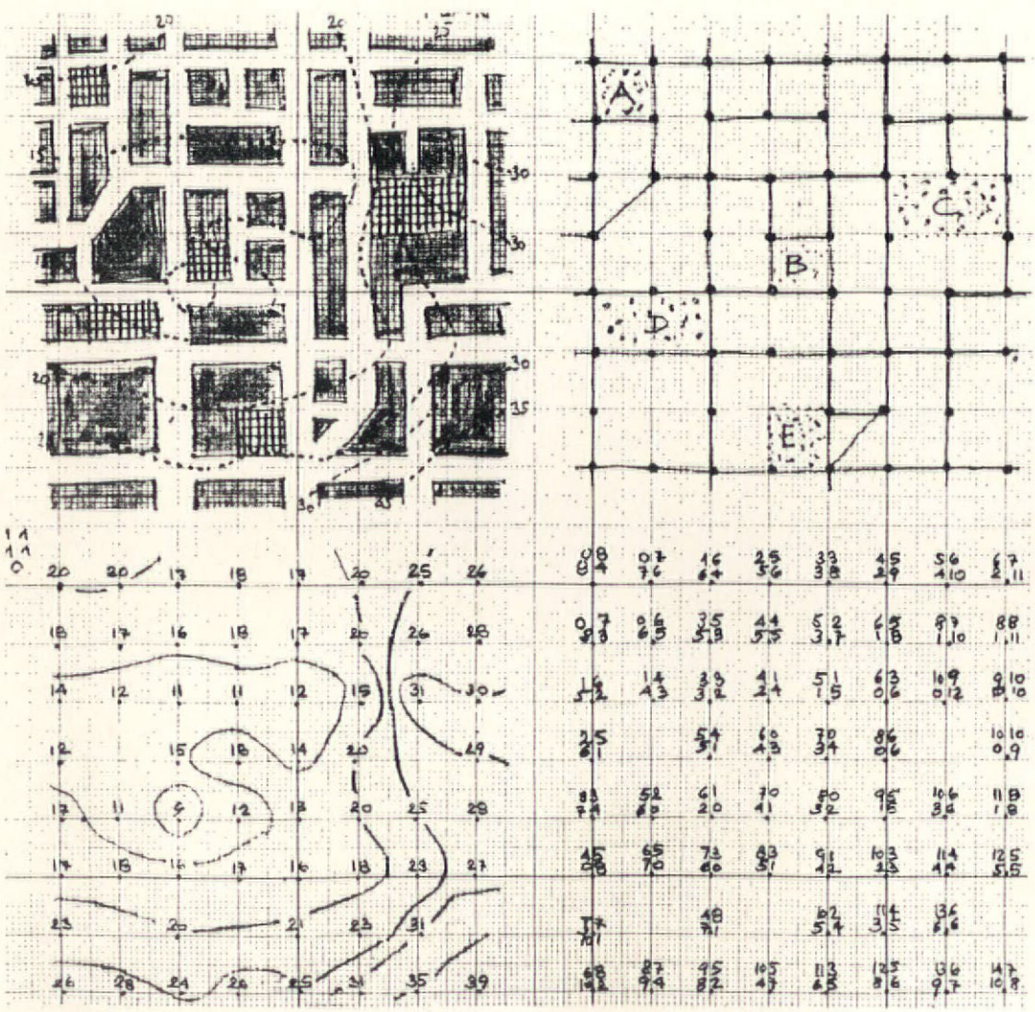
1
A configuration of obstacles In space in which the inhabitants move toward different 'goals' with different weekly frequencies can be simulated by a computer to give the overall pattern of 'effort' in an urban mechanism. This is demonstrated graphically either by 'iso-effort' contours or by numerical 'effort values'

2
An example showing the 'iso-effort' contours between Les Halles and the Gare de l'Est in Paris



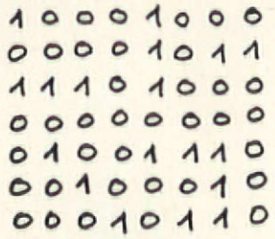
1

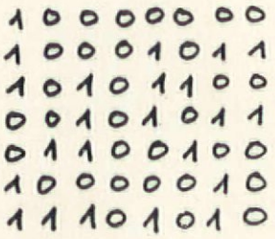
2

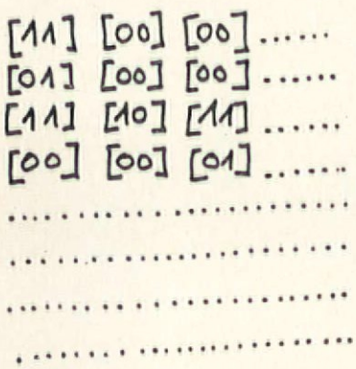
correspond to previous description of urban mechanisms:
Construction of binary matrices which will represent all possible configurations of 'obstacles'. The constraints of the operation are derived from several fundamental planning considerations, such as conditions of natural light, conditions of levels, conditions of access of all usable volumes, and distinction between similar configurations,
Distribution of target addresses, corresponding to each of the four activities in the configuration-matrices, domicile, work, shopping and leisure,
Construction of different distributions of frequencies of movements towards each category of target (domicile, work, shopping and leisure). The frequencies are calculated on a weekly basis. These frequency distributions, representing the complete lists of possible behaviour patterns, will be built of frequency values going from 0 to 7. As we use 4 categories, this list will not have more than 7^4 terms.
Construction of a list representing proportions of inhabitants having a given behaviour pattern, as listed in the previous paragraph. The groups below the 25 per cent will be considered as negligible, as their behaviour pattern does not influence the urban mechanism in a decisive way. (This list will show all possible behaviour patterns. The list of possible behaviour patterns will not exceed 6 million).
Addition of all 'steps' necessary to be taken by each inhabitant (or group of habitants) for particular journeys. Each path will be multiplied by the frequency (determined by the category of the journey concerned, and by the appurtenance of the inhabitant to a given behaviour group.
The magnitude of this sum will be considered as characteristic of the effort deployed by a set of inhabitants, having different behaviour patterns, in the everyday use of their city, as represented by the binary matrices.
The final result of the experiment will take the form of a matrix, having in one axis *all the distinct obstacle configurations*, and in the other axis *all the 'behaviour' patterns*. To each couple, composed of one configuration and one behaviour pattern, there is an associated value in the matrix, showing the appropriate effort-value (sum of steps necessary to make a journey). This final matrix could be represented graphically and would show the underlying forces in an urban mechanism.

Use of the matrix

The matrix resulting from these operations could serve several purposes: One of these would be as a *warning device for the planner, urbanist or sociologist*. This device will allow the planner to choose an admissable 'ceiling' of effort as the basis for his project, to assure a reasonable efficiency of functioning for his project. The final matrix will indicate to him *a set of solutions*, possibly a great variety, but from the point of view of 'effort value' none would exceed his ceiling. The planner is supposed to select this from the matrix by 'freezing' the variable independent from his field of study. The physical planner would thus freeze the behaviour pattern corresponding to the data he got, in the row of 'behaviour patterns'. The sociologist would do the same in the column of 'configurations', representing the configuration of the existing town he was working on. After this 'freezing', the planner looks up all the effort values lower than the ceiling he set for himself.
This implies that the final matrix does not suppose the existence of one unique solution as the most appropriate, but it supposes the selection of a set of equivalent solutions with a mean efficiency level. Thus *the planner could make a preferential choice* among the solutions of this set, *without being afraid that the efficiency* of his proposal *should suffer because of his other preferences* (for example, aesthetic ones).
Alternately the matrix could be used as a *research tool*. The implicit regularities contained in the final matrix will be able to lead us to discovering 'laws' of planning (in the sense of laws of natural sciences). For example, we should find out whether it is true that urban mechanisms have a tendency to transform themselves into mechanisms of lower effort, or whether they tend to develop to a steady state, or whether they have any tendency at all. We shall also be able to observe certain transformations in existing cities, and could try to interpret, by the corresponding transformations expressed in the matrix, some mathematical regularities.

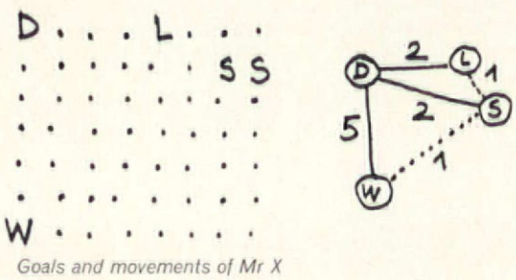




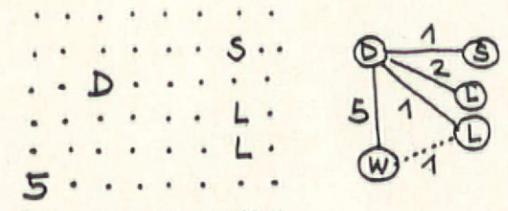


Operation 1

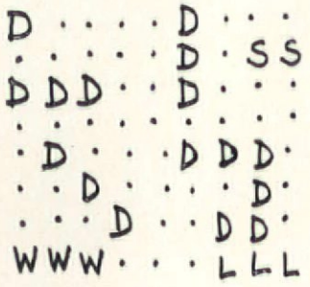
The possible configurations of obstacles are represented as binary matrices. The constraints imposed are that the sum of the signs (1) and the signs (0) should be the same ($\Sigma(1) = \Sigma(0)$), and that every sign (1) is contiguous to at least one sign (0). The third matrice is the combination of the other two, or two levels of a spatial infrastructure



Goals and movements of Mr X



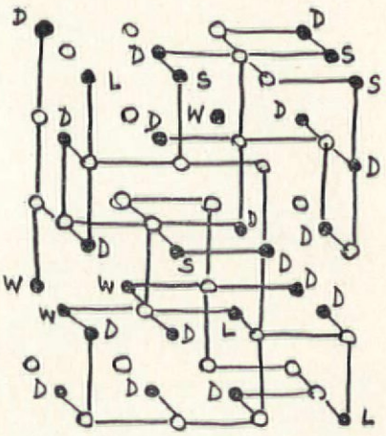
Goals and movements of Mr Y



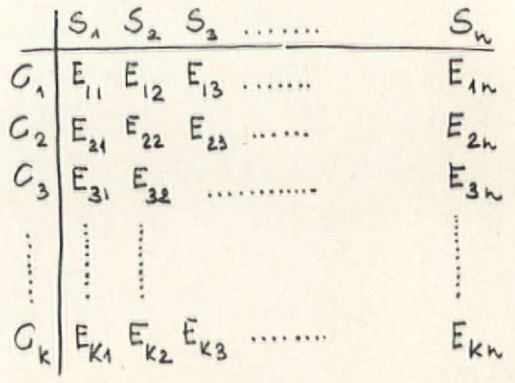
The goals of Messrs X and Y are located in the matrix of the configuration of obstacles in the urban mechanism

Operation 2

The four categories of goals, domicile (D), work (W), shopping (S) and leisure (L) are distributed in the matrices. Their positions are determined by the 'behaviour pattern' (B) of each individual. This is assessed according to the weekly frequency of journeys between the four goals, giving 74 (2401) possible patterns. The type of 'society' can be assessed according to the percentages of each 'behaviour pattern', for instance a 'society' might be composed of 50 per cent (B1), 25 per cent (B2), 25 per cent (B3)



A three-dimensional configuration of the four categories of goals (domicile, work, shopping and leisure)



Operation 3

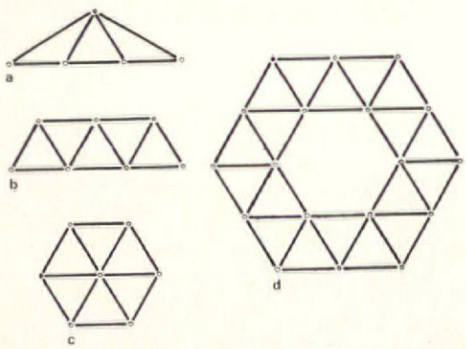
The overall effort (E) of journeys in a given urban mechanism can be calculated by a final matrix based on the types of society (S) and the configuration (pattern of obstacles) of the mechanism (C)

Structural economy

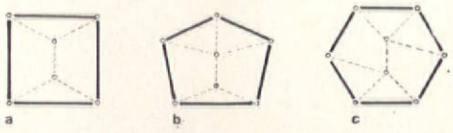
D. G. Emmerich

In theory modern architects have extolled structure, but their interest has focused on its decorative possibilities, not on its static qualities. Modern architecture is a decorative art. The problems of construction and production have been left to engineers, who have lazily resorted to ready-made formulae. The great and varied innovations in building technique during the last fifty years have led to little equivalent increase in building production, and certainly to no real re-appraisal of traditional systems of construction. This is a technical failing, not an aesthetic or an economic one. For building is a process of construction. And a construction is, by definition, an assembly of elements related to form a whole. This is made up of myriad elements which combined together, may create stable or unstable systems -though architects are generally more concerned with stable combinations. Stability may be achieved either by geometrical arrangement or by the sheer strength of materials. Since architects have preferred the cube—a notoriously unstable figure—to all other geometric shapes, they have relied, for the most part, for their stability on the strength of materials. But there are an infinite variety of forms which are structurally more efficient.

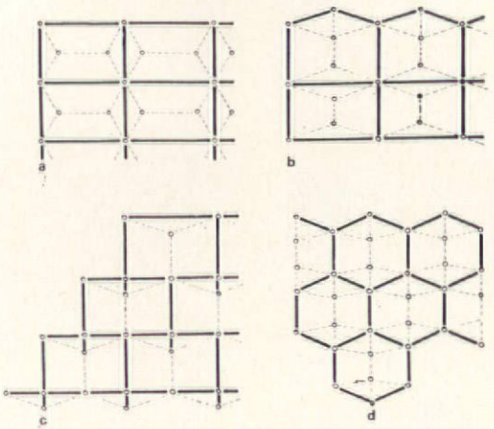
A triangle made of three struts is stable, even when the joints are articulated. But a square of four struts is made stable only by reinforcement.



Similarly, a two-dimensional system made of rigid struts and articulated joints is unstable unless it is arranged as a series or a closed cycle of triangles. Only such arrangements as those shown above are stable, though even they are liable to buckle.



Yet there are two-dimensional figures, with articulated joints and some non-rigid members that are neither completely nor regularly triangulated, but stable.



Because they are stable and therefore the equivalent of triangular structures, they can be combined together in a similar way to form stable arrangements. Some of these can even be rectangular.

The only formula known to engineers for establishing the stability of a three-dimensional arrangement of struts with articulated joints is based on triangulation; the relationship between the apices (A), the edges (E) and the planes (P) confirms Euler's formula, and each plane is defined by three edges and each edge by two planes.

$$A - E + P = 2$$

$$P = \tfrac{2}{3}E$$

from which

$$E = 3A - 6$$

However, in accepting that a framework is stable if $E = 3A - 6$, unstable if $E < 3A - 6$ and excessively stable if $E > 3A - 6$, one is ignoring the fact that this law is valid only for convex bodies, and that the Eulerian characteristic c—here 2—changes with the topological proportions of the forms, in relation to their connectivity. If the number of connections is k, the general formula will be

$$A - E + P = 2 - k$$

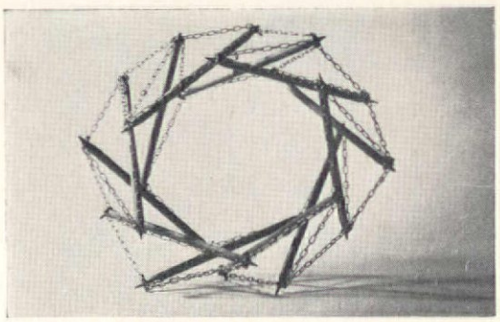
So that in the case of a triangulated body of a simple ring type, the formula will become $E = 3A$, allowing a saving of six struts over a convex solid, and in the general case of a superior riemanian surface of k connectivity—such as multiple rings or second order layers of polyhedra—the formula will be:

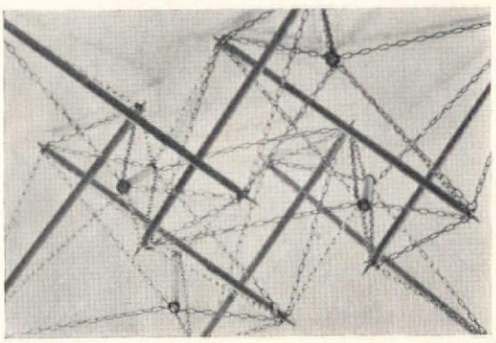
$$E = 3A + 6k$$

But one can also compose more complex solids, where the relative number of struts is greatly diminished. A tensegrity structure, (self-tensioning equilibrium) that is not triangulated although topologically convex is, for instance, perfectly stable when only one member in four is rigid. Here $E = 2A$, which is quite different from the usual formula $E = 2A - 6$.

To build solidly, therefore, to provide stability, does not depend on the strength of materials alone, but on shape—an often neglected factor. Particularly in modern engineering and construction where all research and effort is concentrated on the rigidity rather than the stability of articulated compositions.

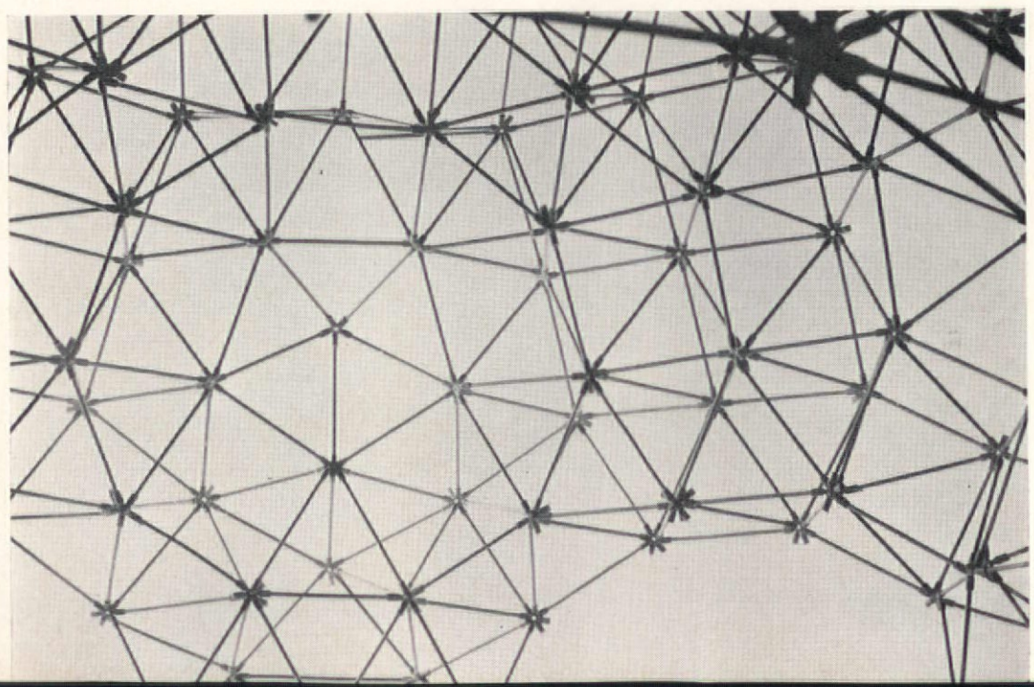
Light, adaptable and highly efficient space-frames can now be built with a minimum of material and a minimum of effort, and it is only through an exploitation of these means of construction that the tremendous building programme of the twentieth century can be economically undertaken—our housing programmes will fail unless they take such structural economies as their starting point.

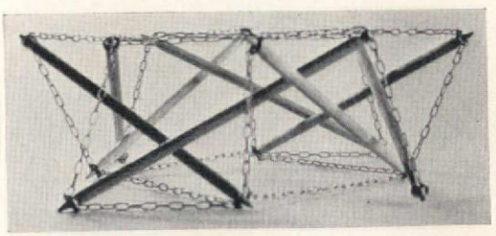


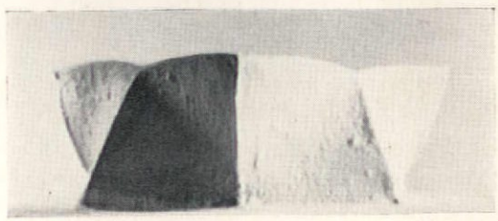


Below

Models, showing a possible framework, on a square base, to be used in building a house. When the framework is covered with net and sprayed with plastic, it can be dismantled and re-used in another position, the hardened plastic serving as the structure







Left

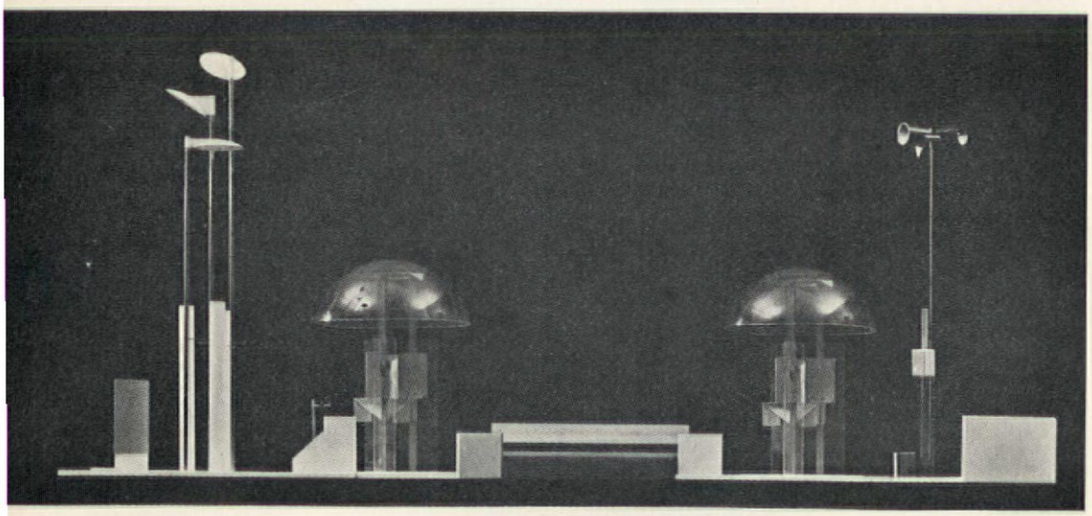
Overall view and detail of a domed structure, in two layers, made up of 840 identical bars and articulated

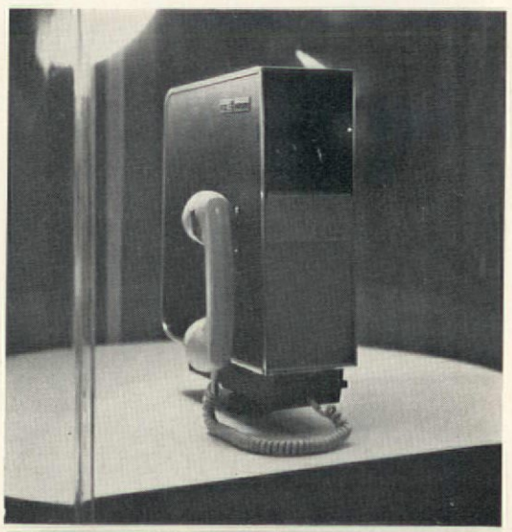
Design

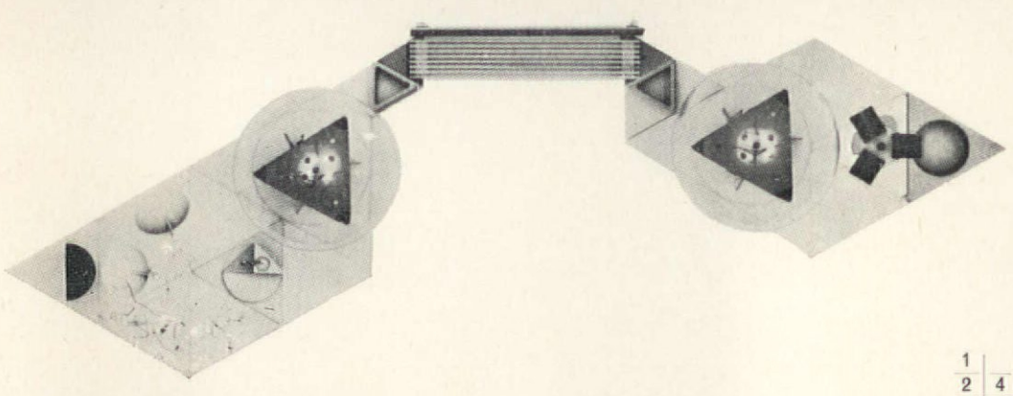
From EXPO 67

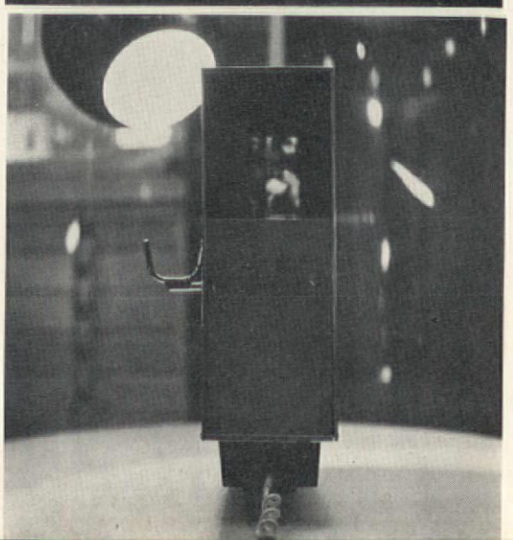
In order to unify the total EXPO site and provide an order and relationship between the diverse projects and environments, a coordinated modular system of site furniture units was designed for the CCWE by F. Villa/Frank Macioge Assoc. Each of the components could be used separately or combined in various groupings **2, 3.** There were triangular concrete mailboxes and drinking fountains; triangular fibreglass trash receptacles; long cedar benches supported on tetrahedral concrete bases; grouped lights, each light consisting of a fibreglass reflector at the top of a stainless steel pole supported in a translucent fibreglass cylinder base which contains the light source; white synthetic material 'tent' shelters carried on steel supports and cables; and, most successful of all, telephone booths **1.** These each house three telephone units separated by tinted acrylic panels, and supported on steel sections which attach to a triangular concrete base and a triangular steel plate at the top. They are 'roofed' by a transparent acrylic dome carried by the upper-steel plate. The telephone itself is the push-button type—dead simple, a steel plate with three coin slots at the top, 10 square push buttons which disconcertingly sound different notes when pressed ('my number is three Blind Mice. What's yours?'), and a lightweight receiver set hung in front of them.

Talking of telephones, there are attractive public call-boxes **7** outside the Telephone Pavilion by David, Barrott and Boulva, made of coloured acrylic sheet bent in the steel frame and topped with an inverted dome light. And in the Japan pavilion, visitors can test Sony's TeleVphone **4, 5** with its optional viewing.









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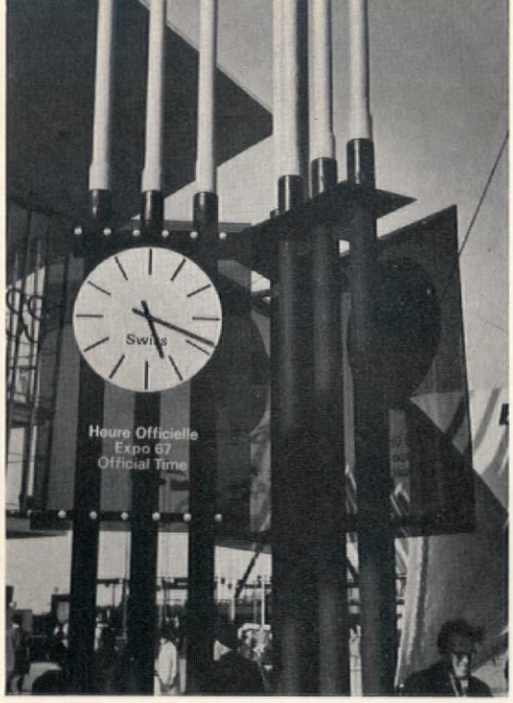

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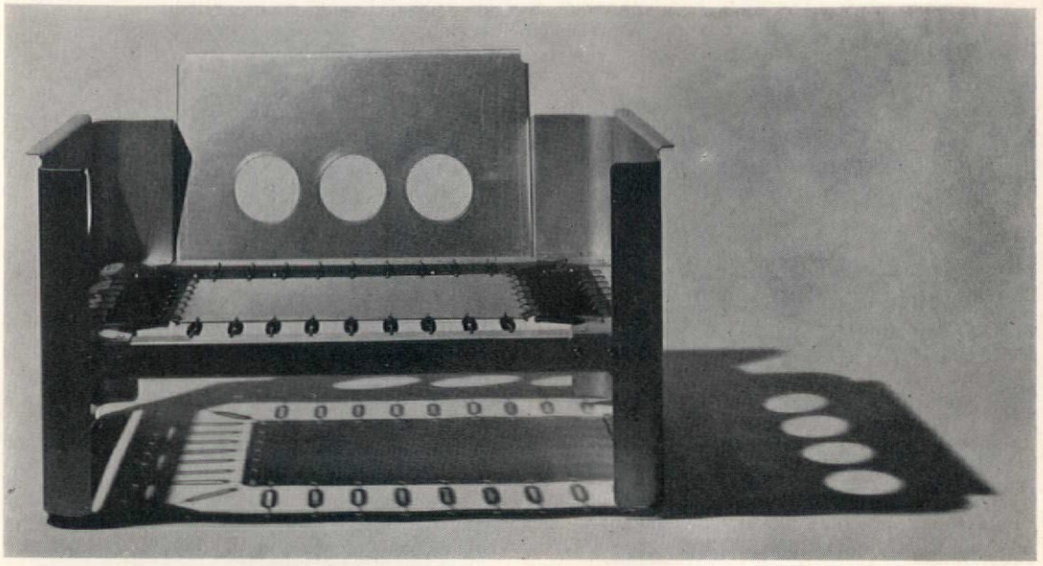
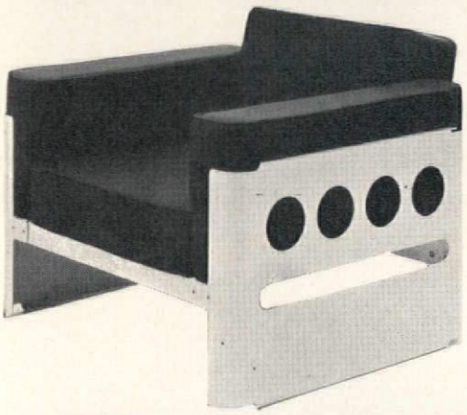
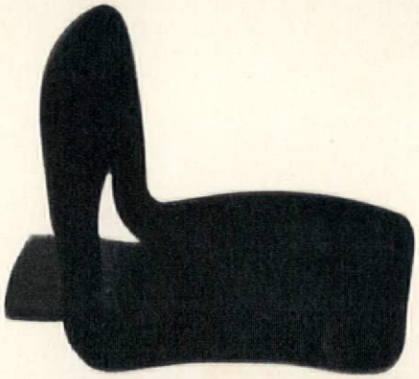


Grouped electric clocks **6** around the site are set in tinted acrylic panels bolted to steel supports.

Of furniture inside national pavilions, 2 chairs attract attention. One is an ingenious moulded ply legless chair in the Japanese pavilion, with a piece half cut out of the back but left attached as an extension to the seat, to stabilize it if resting on a horizontal plane **10,** or to cantilever it from a vertical plane **11.**

The other is a chair of anodized aluminium sheet and varnished steel **8, 9** with foam-filled cushions and zipped-on covers, designed for the Austrian pavilion by Walter Pichler and made by R. Svoboda & Co. of Vienna.





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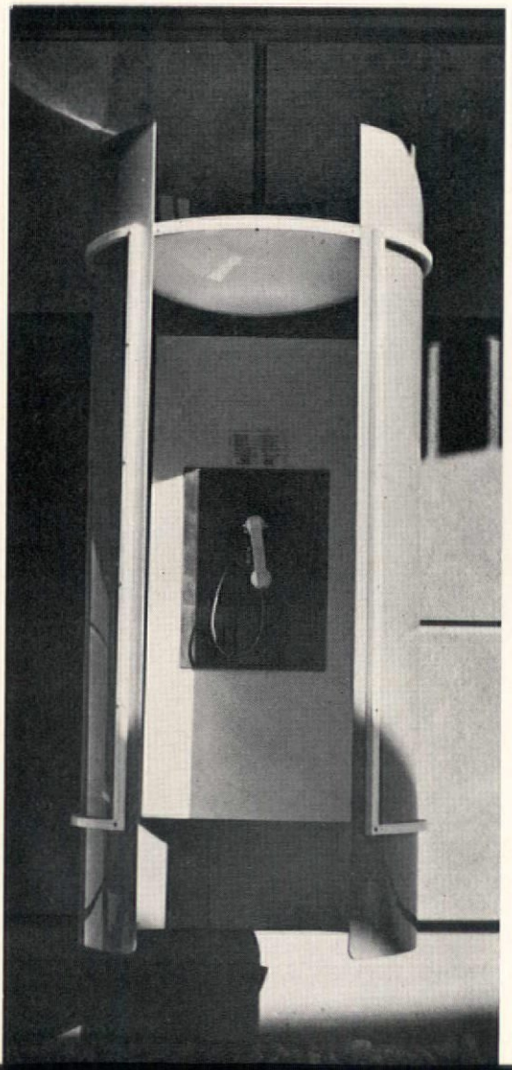

7, 11

▷385

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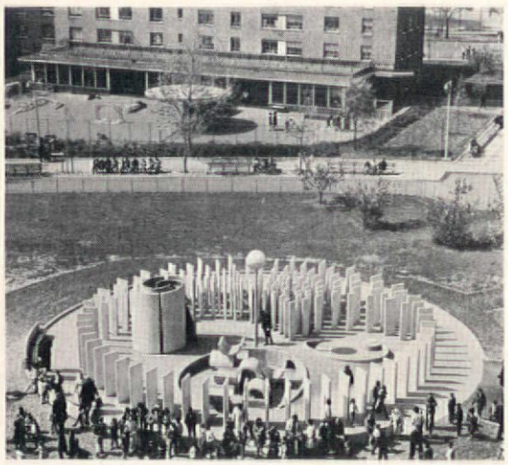


1

2

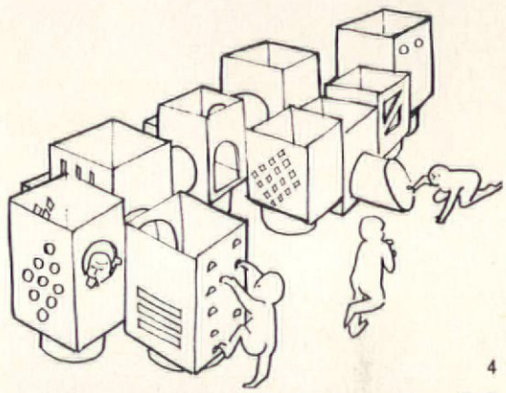
3

New York playgrounds

Of three experimental playgrounds sponsored by the New York City Housing Authority, the Museum of Modern Art and the Park Association of N.Y. City, to the design of architect Charles Forberg, the first **1–3**, for three- to eight-year-olds, opened in the Cypress Hills housing project in Brooklyn last May. Seventy-two feet in diameter, it has a forest of 7ft concrete slabs for shelter and hiding, with holes and painted designs to add variety; a tower combining spiral stair and slide; a group of vaults for clambering and hiding, encircled by an embankment; and a spray fountain bridging flowing water. In the evening, illumination comes from a central spherical fixture.

In Park Avenue, Pepsi Cola have sponsored an indoor playground **4–9** (see *Mobilia* 4/67), designed by Jerry Liberman and Guy Fong (who are going to repeat it in Brooklyn). They used only existing chemically-produced products—plastic refuse bins as a chain of cubes connected by tubes, for crawling through; sheets of Ethafoam glued into large shells or winding tunnels, or stacked up to use as a trampoline; reinforced glass fibre one-person see-saws or swinging poles; plastic jet engine covers used as sand-trays, the sand being the plastic beads used by American poultry farmers to prevent fowl from overeating.

▷386



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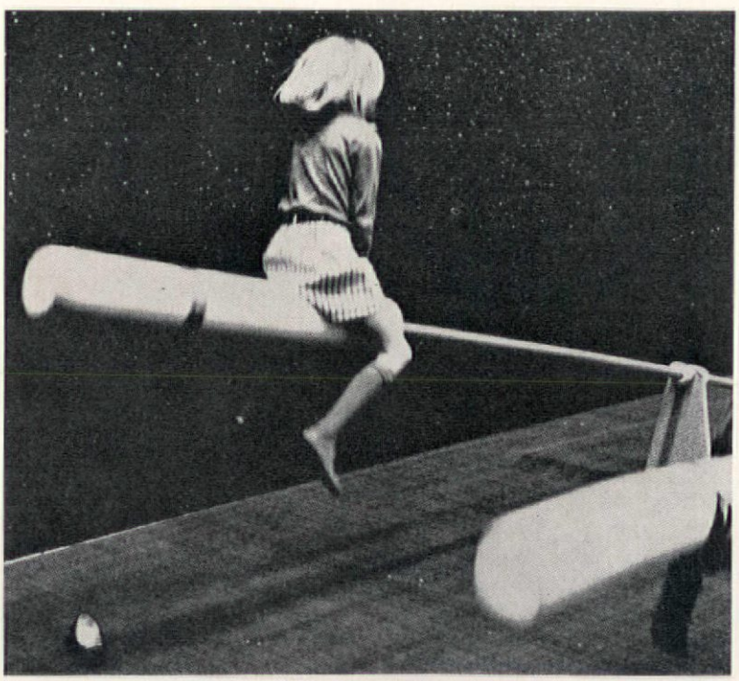

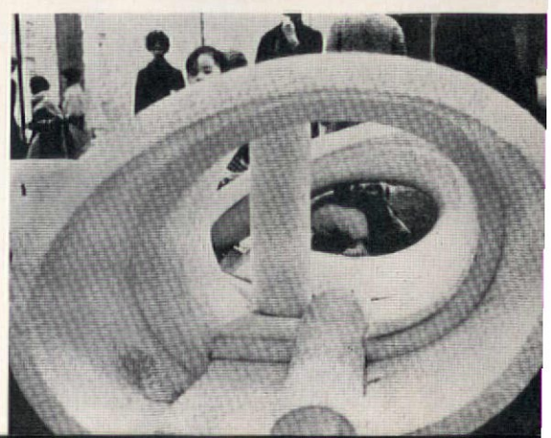

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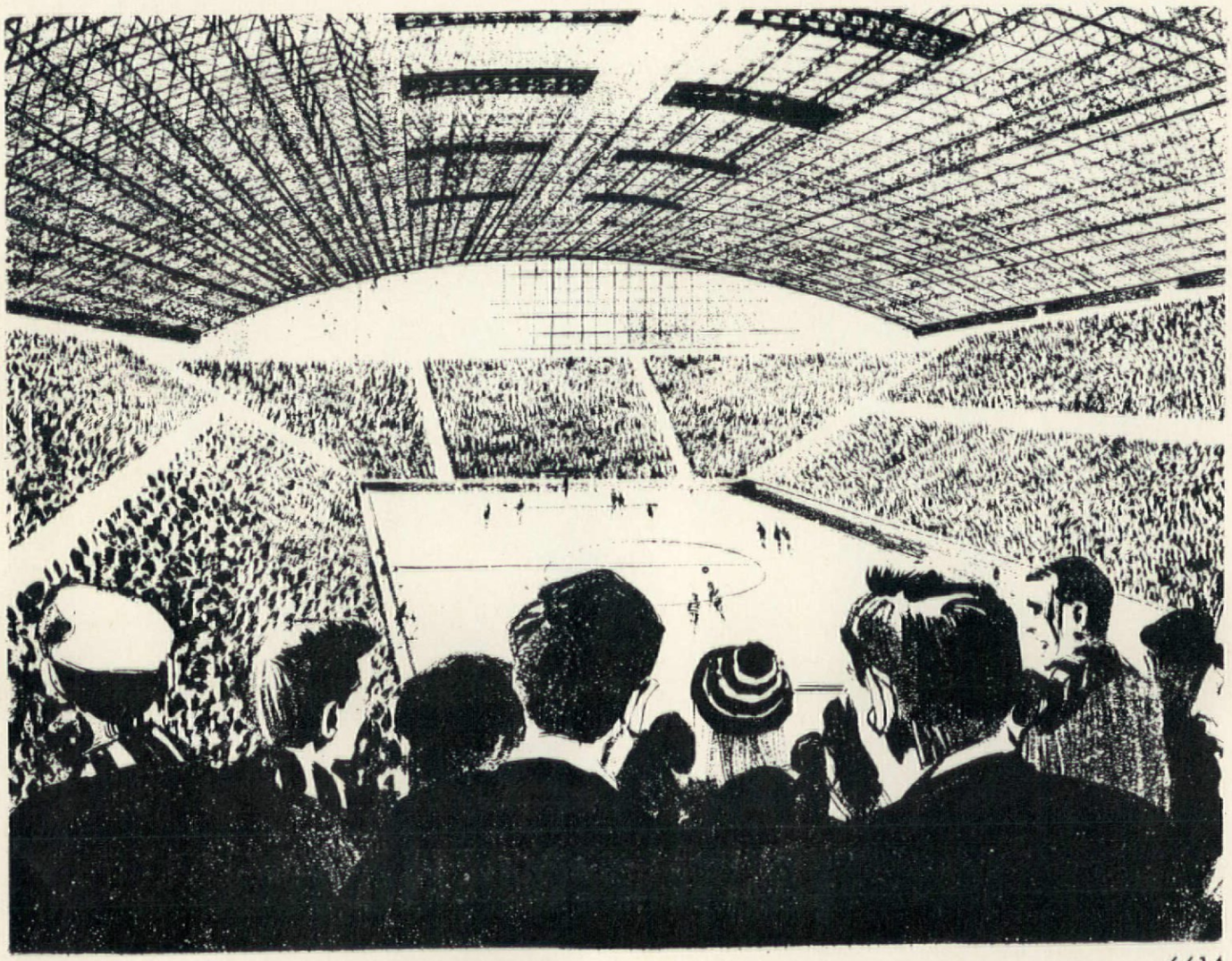


6614

Gowan-Schreiber furniture 1-4

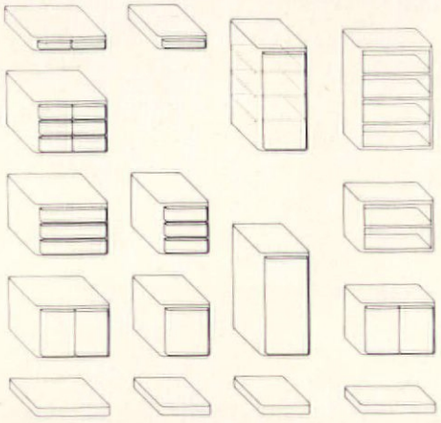
When James Gowan designed a house for the furniture manufacturer, Chaim Shreiber (*AD* 6/65), they developed laminated plywood storage units for it which were based on the Schreiber system shell-forming presses which can mould all four sides of a carcass or drawer in a single continuous piece. Curved corners are characteristic of this technique. The carcases have great structural rigidity because of their tubular form and have few of the jointing complications that arise in traditional cabinet-making. The units have now been put into production and will be available in Britain by September.

Dimensions are based on a 10cm module, so that the units can be linked horizontally, or stacked on top of one another, to form storage islands or walls (backs are finished to the same standard as all the other sides).

The widths are 60 and 90cm, the depths 30 and 50cm and the heights 60 and 120cm. The removable plinth, which runs on inset castors, is 10cm high and this gives a working level of 2ft 3½in (70cm) when used in conjunction with the single-height cupboards and drawers.

To give an idea of prices, a double cupboard 3ft wide × 2ft 4in high × 1ft 7½in deep, plus plinth, would retail at about £40 in the UK.

Schreiber Furniture Ltd., Rye House, Hoddesdon, Herts.



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8	

Chairs

Hille's polypropylene **5**

The famous polypropylene chair programme has added a light navy blue to the existing colour range of light grey, charcoal and flame; and Robin Day has designed two bar stool bases to go with the standard shell.

Hille, 41 Albemarle Street, London, W1.

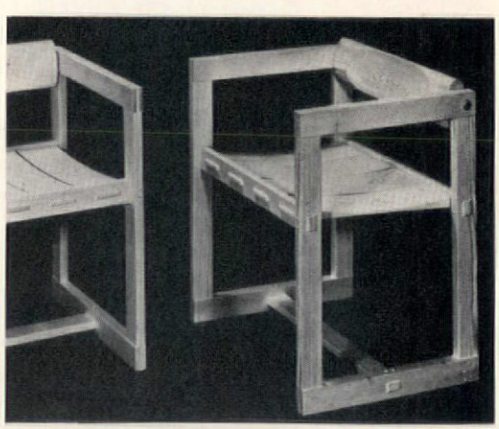
Swedish contract furniture **6**

Finmar is introducing into Britain from Sweden Lammhults Mekaniska Verkstad's range of contract furniture—work tables and chairs. Simple in design, they are offered in a choice of four different woods, six vitreous enamel finishes to the steel tube, three types of upholstery material (seven colours of each) or Skai-Flor upholstery plastic (six colours). Shown here is the 'Örebro' set designed by Ake Axelsson and Erik Karlström. (Prices by quotation.)

Finmar Ltd, 32 Avon Trading Estate, Avonmore Road, London, W14.

Norwegian pine chair **7**

Also from Finmar is an £11 11s. pine chair, part of a range currently being made by the Trysil county borough in central Norway, owners of extensive forests whose wood they have recently started to use for houses as well as furniture.



Modular seating by student **8**

Third year design student Andrew Cowen (High Wycombe School of Design and Furniture) has produced a system of modular contract seating. The continuous tubular steel framework employs a single angled unit which connected by a special link provides leg support and armrests. Two units link together to form a continuous framework; the same units are used to alter direction. A single straight leg completes the framework at the end of each row. Preformed seat units, upholstered in polyurethane foam, slot into the frame—as do table tops also. The framework can be cornered at 45° or 90°, and can be folded flat for transport.

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You should. Wherever and whenever seating, space and good taste play an important role, you're likely to find Remploy-Stafford linking furniture. Designed on a modular system, each handsome piece can be used on its own or quickly linked together in any variety of combinations. It's easy. No hooks, clips, loops or mechanisms – nothing to go wrong or damage clothing. Any piece links with any other. Locks rigid. Available in elegant fabrics designed to keep their good looks for years.

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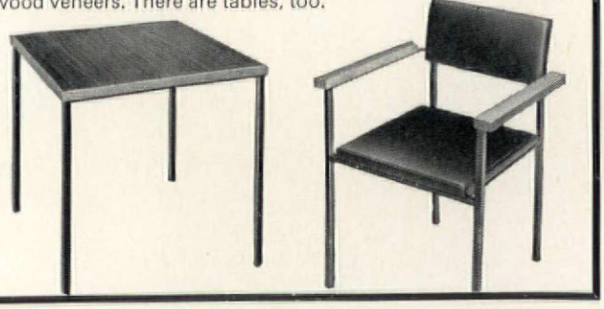

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Trade notes

Alexander Pike

To obtain additional information about any of the items described below, circle their code numbers (X1, X2 . . . etc.) on the Readers' Service Card inserted in this magazine.

X1 Closed circuit television
Modern Telephones (Great Britain) Ltd., Telesound Centre, Chalcot Road, London, NW1
A closed circuit television rental service offers a full range of equipment, including fully transistorized cameras providing automatic quality transmission. A selection of portable monitors are available with screen sizes from 8in to 24in.

X2 Mat wells
Cimex Limited, Cray Avenue, Orpington, Kent. Orpington 26731
Employing aluminium alloy sections connected by a patented plastic cornerpiece a new made-to-measure mat well eliminates the need for specially made metal frames. The components are delivered cut to size for assembly on site, and are suitable for any type of mat.

X3 New carpeting
The Carpet Manufacturing Co. Ltd., Kidderminster
Debron, claimed to be possibly the toughest form of carpeting ever developed, consists of 100 per cent nylon pile bonded to a strong PVC backing, has now been considerably improved by the incorporation of a heavy duty glass fibre fabric in the PVC. This offers exceptional dimensional stability and as the product offers a low cost of maintenance and reduces airborne and impact noises it can be used on areas taking heavy traffic where one would normally expect to find hard or semi-hard surfaces.

X4 Gas fired central heating system 1
Servotomic Ltd., 199 The Vale, Acton, London, W3
The Servowarm 40, with a heat output of 40,000 Btu/h, is based on a master radiator which comprises a combined balanced flue boiler/radiator which heats water and supplies it through small bore pipes to other radiators in the system. The master radiator 31in high by 48⅜in wide by 7in deep can be installed in the living room, dining room or hall and therefore saves a considerable amount of space which would otherwise be occupied by a boiler. The boiler section is enclosed behind a hinged radiator panel which gives access to the consumer controls and lighting aperture.

X5 Flush door
Thames Plywood Manufacturers Ltd., Harts Lane, Barking, Essex. Rippleway 5511
Consisting of 4mm thick redwood plywood faces bonded to a core of expanded polystyrene, the Thamesply-Everflush door is produced in 1⅜in and 1⅝in thicknesses and can be obtained faced in striped sapele, afrormosia or figured makore. Exterior doors 1¾in thick are also available.

X6 Corrosion resistant light fitting 2
Faulks Ltd., 91 Farringdon Road, London, EC1
The Ribble light fitting has all exposed metalwork fully protected with white PVC coating and is intended for use in corrosive areas. Available in single or double lamp units for 2ft, 4ft and 5ft tubes, the Ribble consists of fabricated sheet metal channel made in two sections with urethane gaskets sealing the joints. Each fluorescent tube is completely protected by a 2in diameter Perspex cylinder.

X7 Protective treatment for timber
Desowag-Chemie GmBH, U.K. Office, 14 Mount Ephraim Road, Tunbridge Wells, Kent
An addition to the Xylamon range of timber preservatives, Xyladecor is a non-obliterating decorative finish which gives protection against wood boring insects in the case of the interior version, and in addition protection against fungi and mould for the exterior version. Interior finish available in eight shades, and exterior version in six colours, all intermixable. Cost 46s per gallon.

X8 Vinyl wall coverings
Chamberlain Laminates (Division of W. W. Chamberlain & Sons Ltd.), North End, Higham Ferrers, Northants
Muralon and Super Muralon are hard surfaced vinyl films claimed to be abrasion-, stain- and fade-resistant and washable. They are permanently fused to a fabric backing and are obtainable in surface textures which include weaves, straw, leathers and silks. They have been specially designed for decorating a wide range of surfaces.

X9 Dual purpose light fittings 3
Ronde, 61 Lambs Farm Road, Horsham, Sussex. Horsham 61322
With bases of stainless steel and shades of mild steel coated in polyurethane, the Rondesse range of fittings can be used for table lighting or as wall lights. Available in six colours.

X10 Fluorescent fittings
The Benjamin Electric Ltd., Tottenham, London, N17. TOT 5252
The M range of modular lighting, louvres and diffusers gives a choice of surface, recessed and semi-recessed fittings, trimless troffers and surface mounted fittings incorporating re-entrant diffusers. In sizes 2ft, 4ft, 5ft and 6ft long, in 2-, 3- and 4-lamp fittings.

X11 Damp course insertion
Dampcourse Insertions Ltd., Stamford Street, Mossley, Ashton-under-Lyne, Lancs. Ashton-under-Lyne 2298
The Discovac is a machine for slot-cutting in walls prior to the insertion of damp courses. Glass fibre discs 18in in diameter impregnated with carborundum are used in conjunction with a dust extractor which enables operatives to work without masks in confined spaces.

X12 Stainless steel sinks
Bimits, 6 Welbeck Street, London, W1. 01-935 4953
Manufactured from chrome nickel 18/8 stainless steel, the Prestige range of sinks has six sizes from 36in × 18in to 63in × 21in.

X13 Aluminium stair nosings 5
The Adamite Co. Ltd., Caxton Hill, Hertford, Herts. Hertford 4212
Altro Thinline Nosings are designed for use with 2mm, 2·5mm and 3mm floorings, eliminating the making up of levels previously necessary with standard nosings. The insert is composed of aluminium oxide abrasive grain bonded with hydraulically pressed PVC. Available in ten colours in matt or gloss finish. Cost 7*s* 10½*d* per foot run including Purchase Tax.

X14 High intensity spotlights
Lumitron Ltd., 33/34 Alfred Place, London, WC1. 01-580 4411
Designed for use with 100w bowl silver lamps with super pure aluminium rimmed parabolic reflector units, the units give maximum cut-off producing a semi-hard edge beam of 18,000 candelas. The range of mountings include a matt black adjustable stirrup for ceiling or pendant use and a base plate for floor fixing. Reflector diameter 6in, overall height 9½in, price £2 10s 0*d* (£3 3s 0*d* with base plate).

X15 Building panels
J. W. Roberts Ltd., Horwich, Bolton, Lancs. Horwich 66511
Six types of panel, two for internal positions, in sizes 10ft × 4ft and 8ft × 4ft, and four types for external applications size 8ft × 4ft are available in a range of standard colours and finishes. Core material is either expanded polystyrene or Flaxboard. Internal partitions 2in thick are faced with Limpet board and external panels 1½in thick are faced with asbestos cement sheet.

X16 Display system
Tebrax Ltd., 161 Borough High Street, London, SE1. HOP 4367-8-9
The Byggin-Tebrax display system for exhibitions enables a wide range of structures, booths, desks, counters, or complete exhibition stands, to be quickly assembled using an Allen key and screwdriver. Modular units are built up from aluminium sections and can be filled with panels of any sheet material.

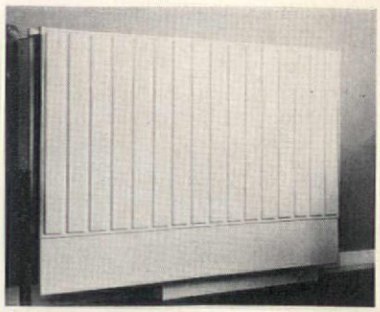
X17 Cooker hood 4
Autocon Manufacturing Co., Electrical & Mechanical Engineering Division, Spring House, 10 Spring Place, London, NW5. GUL 9328
The Univent ductless cooker hood employs two activated carbon air purification filters, each of 144sq in, and two washable grease and fat filters, all of which are removable without dismantling the cooker hood. A specially designed fan with aluminium blades passes over 140 c.f.m. through the unit. Size 25in wide × 20in deep × 5in high. Price £19 18s 6*d*, including Purchase Tax.

X18 Water-thinned epoxy coatings
Corrosion Ltd., Warsash Road, Warsash, Southampton. Locks Heath 3372
Eliminating the hazards of inflammability and toxicity associated with solvents, Sansol water-thinned Epoxy coatings have all the properties normally expected of this type of coating, water and solvent resistance, high chemical resistance and strong adhesion to most building materials. Thinning is achieved by the addition of coloured water.

X19 Fire-resistant plywood
Littlewood-Moore Ltd., The Studio, 3 Woodfield Way, Bounds Green Road, London, N11. BOW 2693
Vedex Fire-Resistant Compact Wood is a beech plywood in which each veneer is impregnated before lamination. The material has a class 1 grading on the Surface Spread of Flame test, and it is claimed that the fire-resistant impregnation is sealed in and cannot evaporate. Standard sizes are 4ft × 8ft 4in, 4ft × 8ft, 4ft × 4ft and in seven thicknesses from 4mm to 26mm.

X20 Adjustable French curve 6
Entwhistle Thorpe & Co. Ltd., 86/88 Pentonville Road, London, N1
The Acu-Arc adjustable French curve can be easily shaped with the fingers to form a guide for drawing smooth accurate curves. The inside edge is raised above the drawing surface to permit the use of a ruling pen. Constructed of clear butyrate plastic, it is claimed to be highly resistant to discoloration and deterioration by age, sunlight and climate.

X21 Fan convectors 7
Myson Heat Exchangers Ltd., Ongar, Essex. Ongar 2255
The Myson Envoy Super range is intended for use with hot water heating systems. The tangential fan extends the full width of the heat exchanger and has an infinitely speed control. The three models all have a height of 16in and a depth of 4⅝in, with lengths of 21in, 30in and 42½in. Electrical consumption is 28, 31 and 43w respectively and maximum heat output 9000, 14,000 and 20,000 Btu/h.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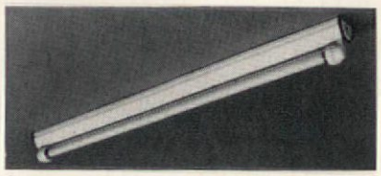
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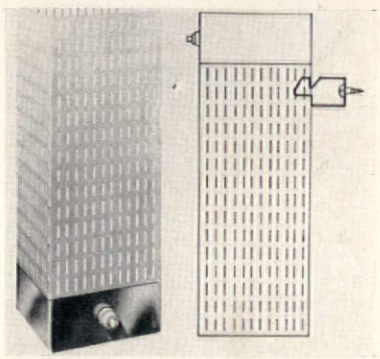
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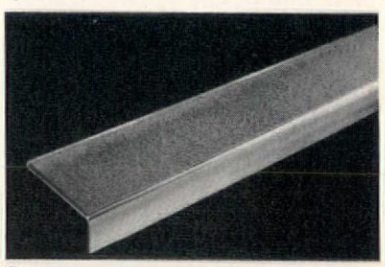
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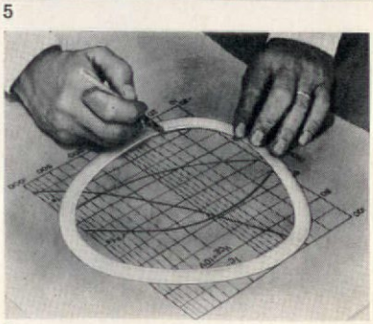
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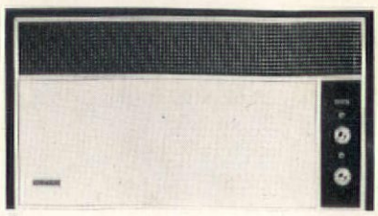
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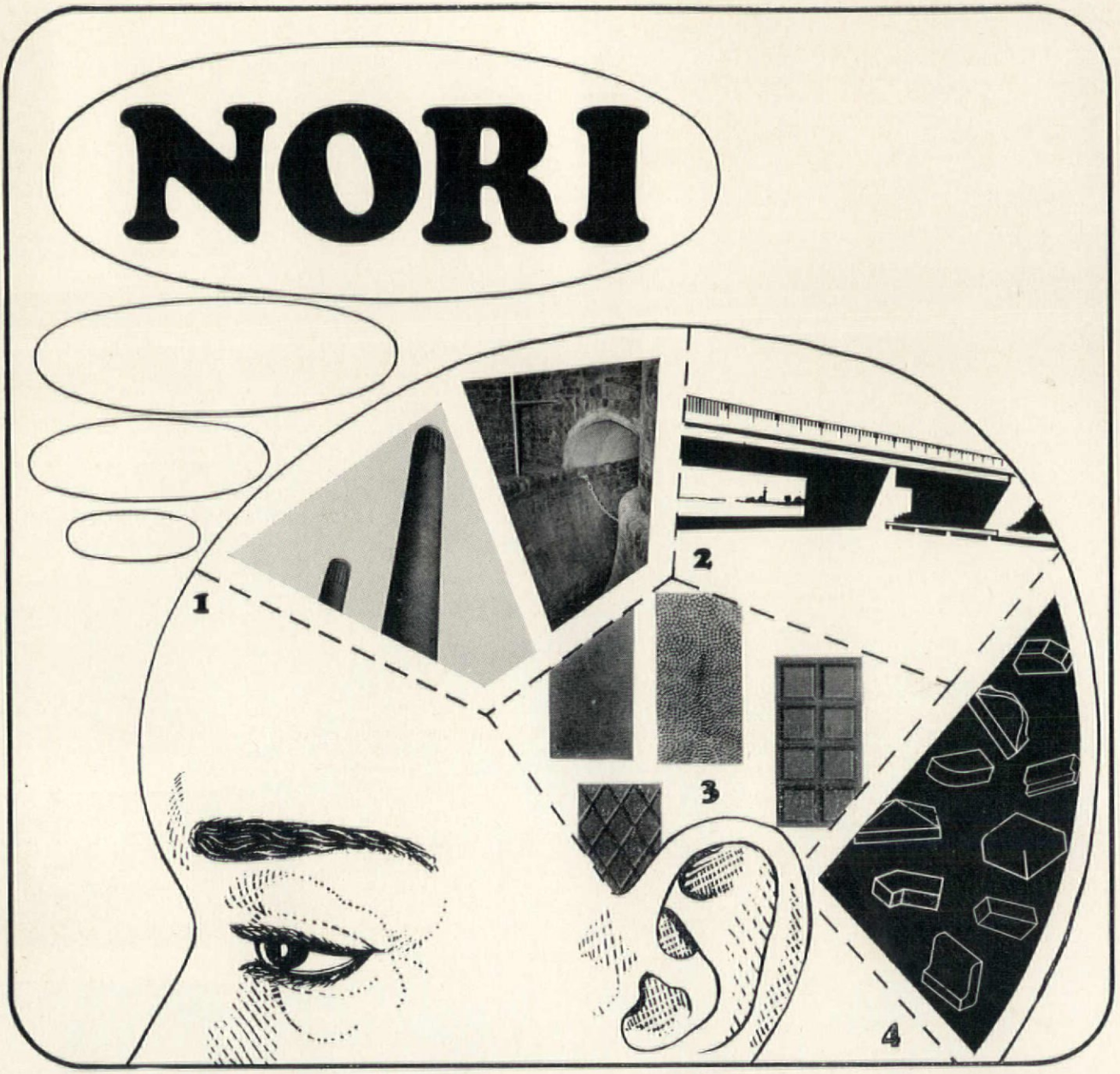
NORI



brick-ology

If you have bricks on the brain and do not know which to choose, here is a simple, phrenological guide to the range of NORI bricks. **1** Nori Engineering bricks have toughness, uniformity, low porosity and resistance to acids and abrasion. They are used in bridges and tunnels, sewage and drainage schemes. **2** Nori Facing bricks are renowned for their service and durability. They combine a first class facing with a body of low porosity and high compressive strength thus ensuring complete resistance to climatic changes and atmospheric pollution. Manufactured in a wide range of colours and textures. **3** Nori Paving bricks are recommended for industrial work where floors are subject to wet corrosive conditions and heavy mechanical usage. They are highly resistant to most chemical conditions and are sufficiently stable to withstand the effect of thermal shock. **4** Nori Special Shapes are available for engineering, facing and acid-resisting work and can be made to order. A specialist in Phrenology may not realise that the range of Nori bricks really does meet the needs of the moment. But you should, so for more information, write to:

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Southern Sales Manager — L. G. Rogers, "Oak Lea" 195 Main Road, Biggin Hill, Westerham, Kent. Tel: Biggin Hill 3338.
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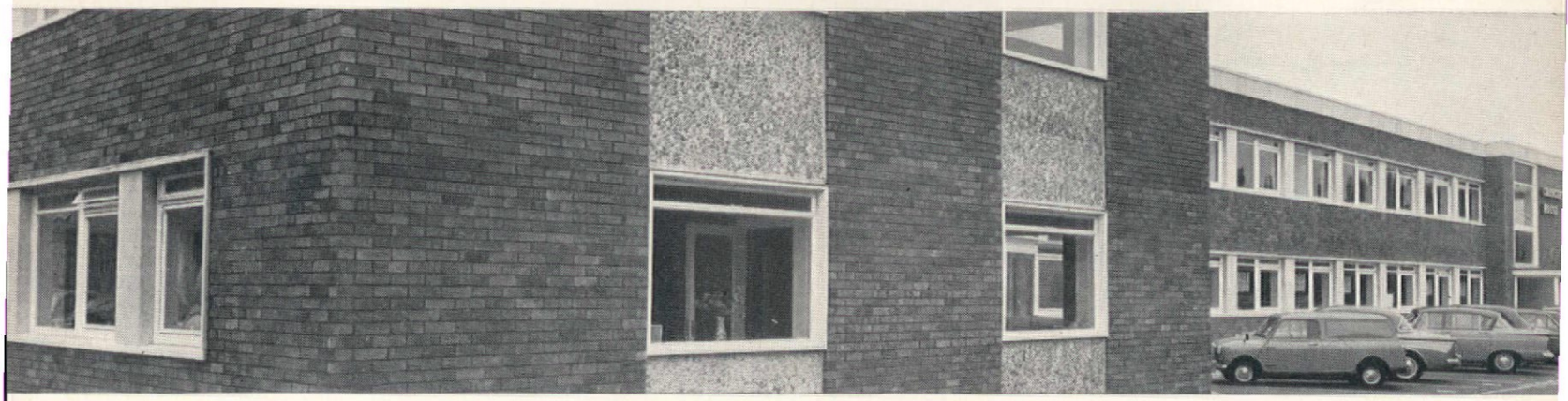
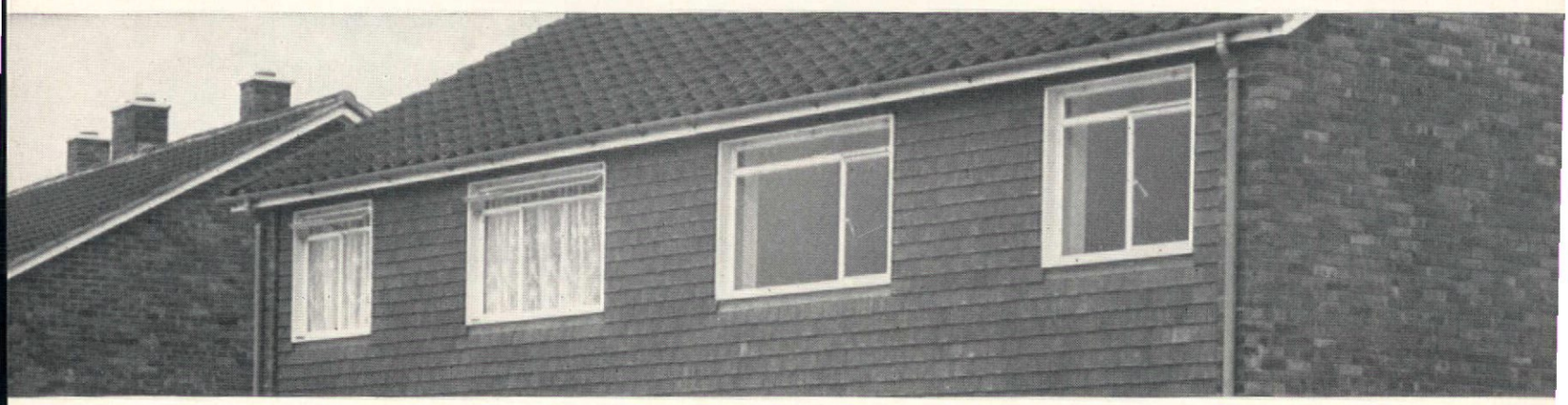
Scottish Agent — James S. Gibb & Co. Ltd., 73 Robertson Street, Glasgow, C.2. Tel: CENtral 7233.





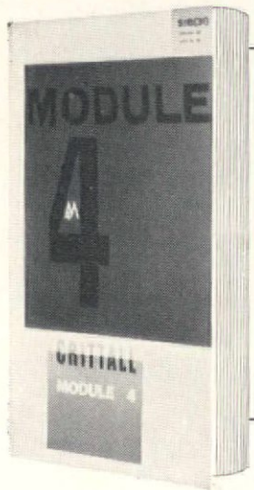
Crittall Module 4 windows

New standards of contemporary design *at low cost*

Note the clean modern lines and pleasing proportions of these Crittall steel windows. No, they are *not* 'purpose-made'. All are standard low-cost 'Module 4' windows. The introduction of the Module 4 Range has meant that today architects can achieve well-proportioned elevational treatments with the economy of STANDARD steel units. Crittall is helping them. Costs are actually *lower* than for previous standard patterns. Weather stripping and double glazing may both be specified. Rust-proofing is by the highly efficient hot-dip galvanizing process.

This new Crittall booklet on the Module 4 window and door range gives the busy architect all the facts he needs. Details of Crittall's latest fittings, pressed steel sills, lintel bearers, and new larder windows are included. *It will be sent free on request – together with a wall chart, if required.*

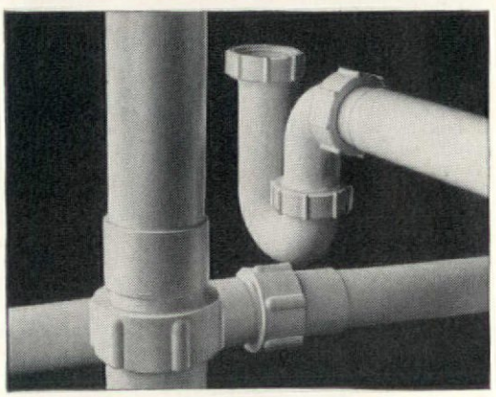
THE CRITTALL MANUFACTURING COMPANY LIMITED · BRAINTREE · ESSEX



CRITTALL
MODULE 4M

CR701

the new Limpet ABS WASTE SYSTEM



The new LIMPET waste system comprises a full range of pipes and fittings with smooth clear bores, sizes $1\frac{1}{4}$", $1\frac{1}{2}$" and 2", manufactured from ABS (Acrylonitrile Butadiene Styrene). The system also includes a full range of traps.

Coloured white, the components are light in weight, robust and resistant to heat and domestic reagents – detergents, bleaches etc.

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The system is designed for use with the recently introduced LIMPET PVC Soil System, or with other soil and waste systems in conventional materials.

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Chorley New Road, Horwich, Bolton
Telephone: Horwich 66511

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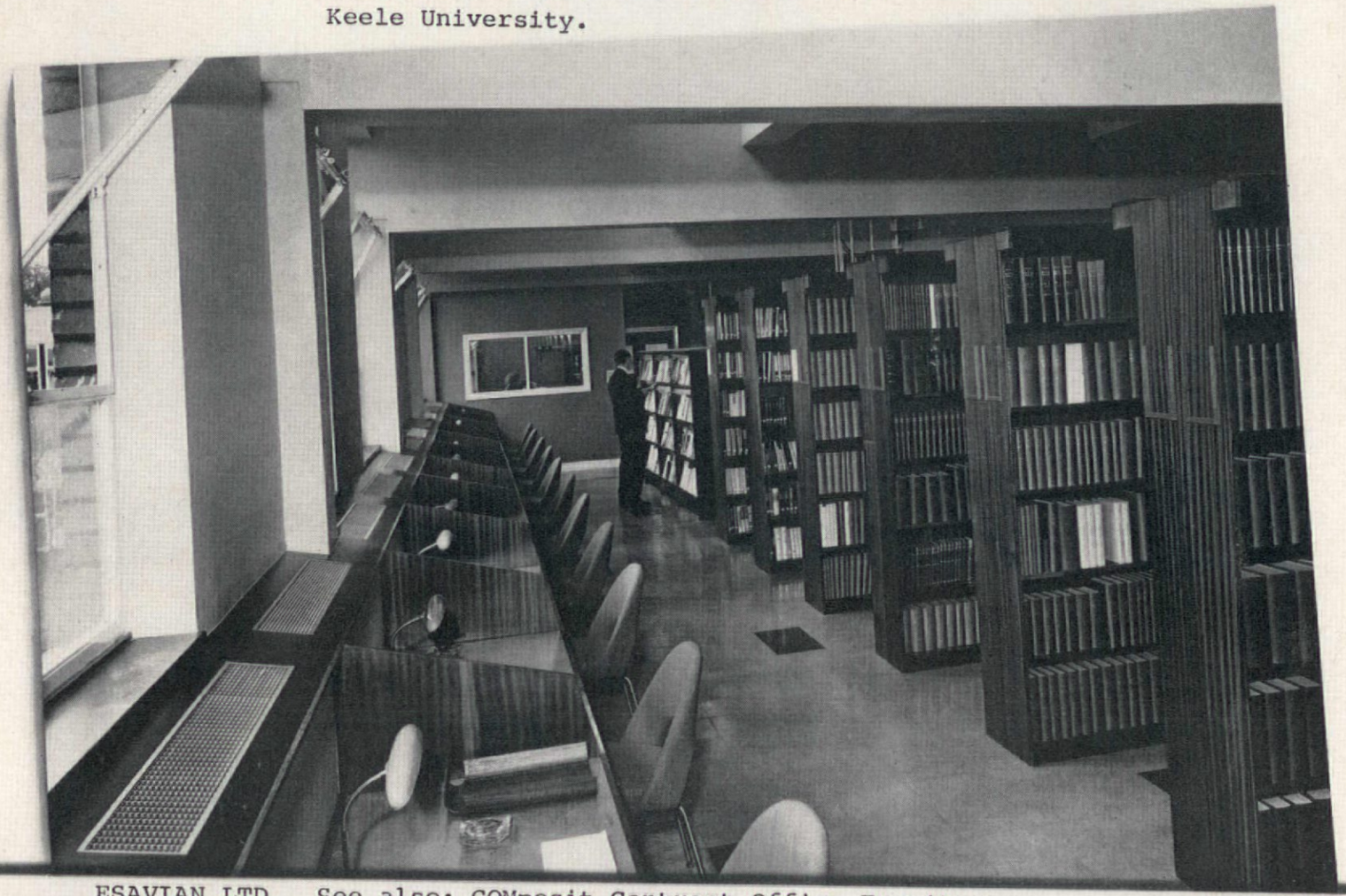

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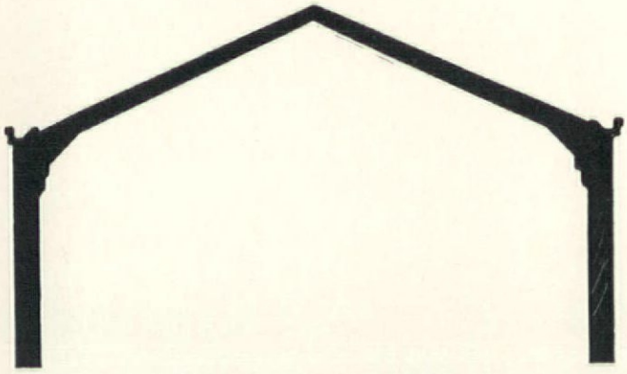

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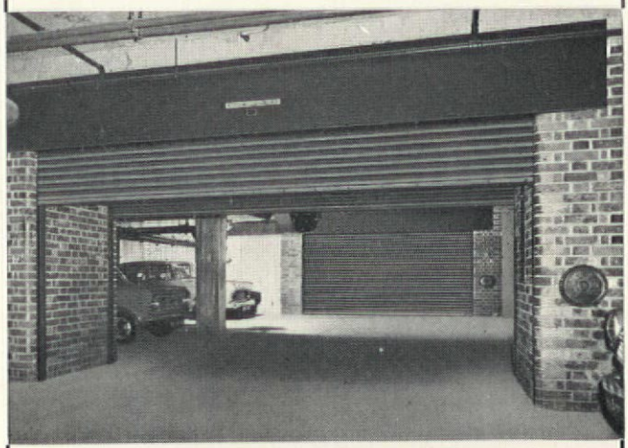

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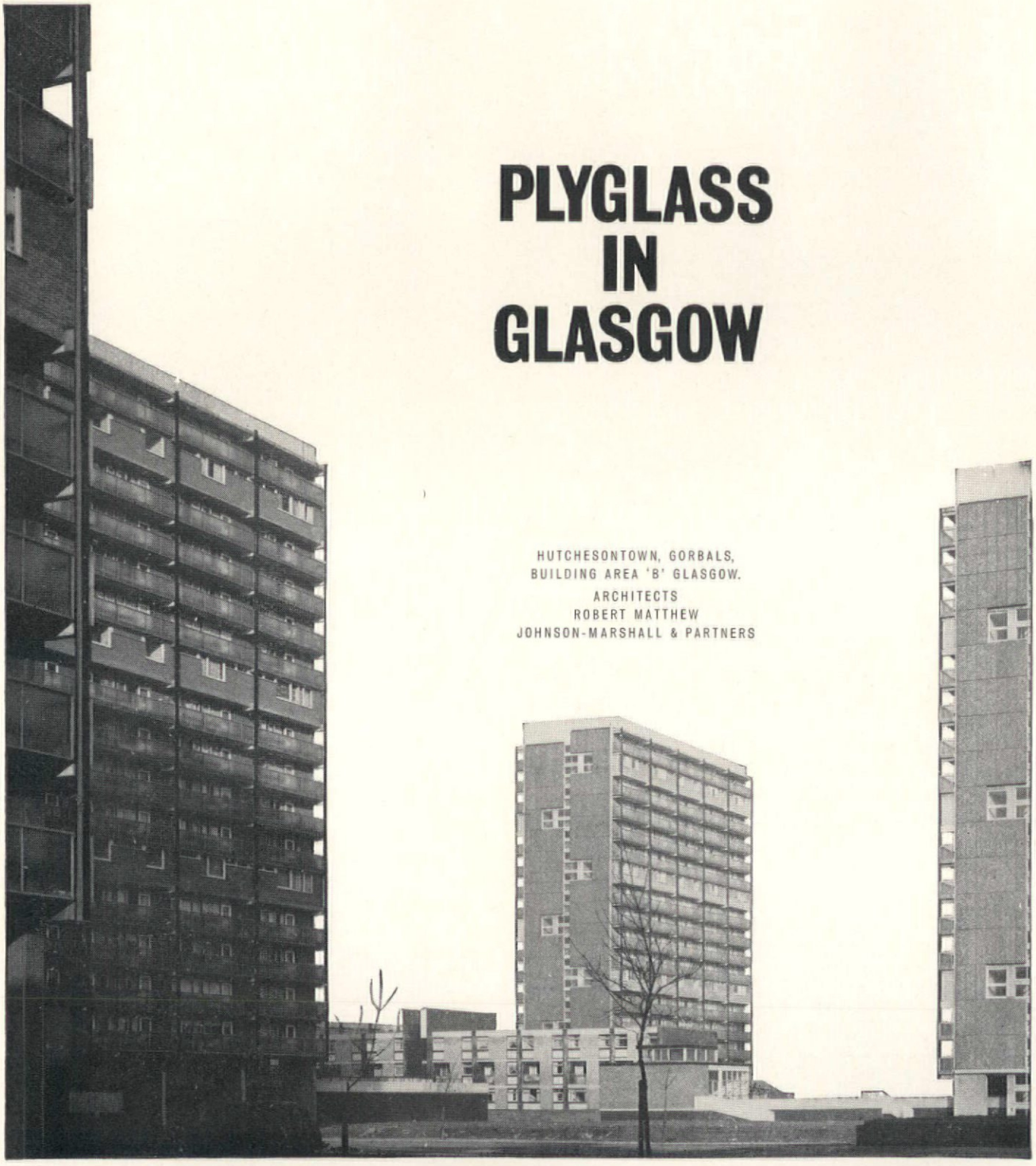

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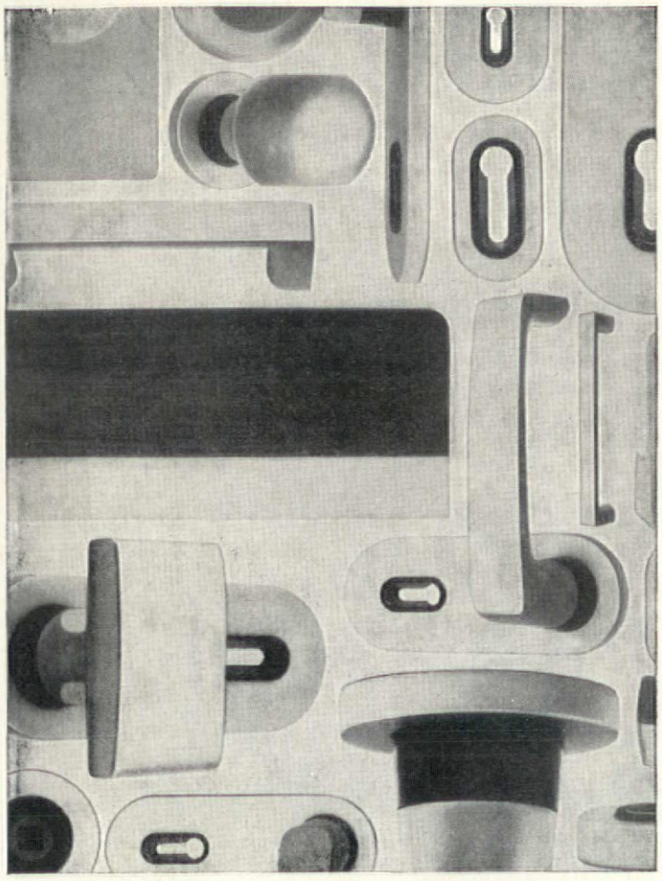

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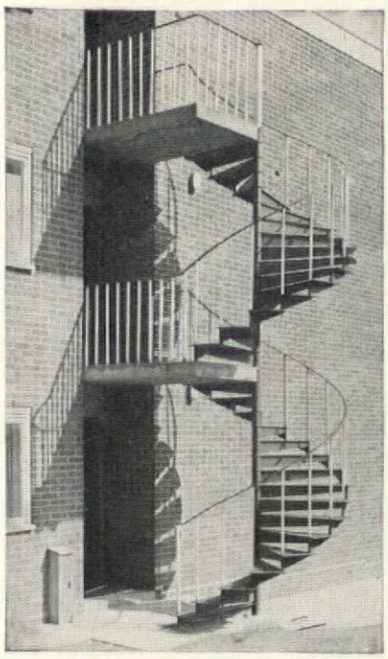

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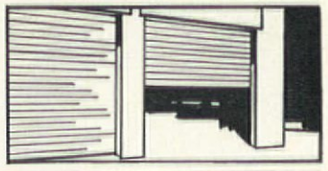

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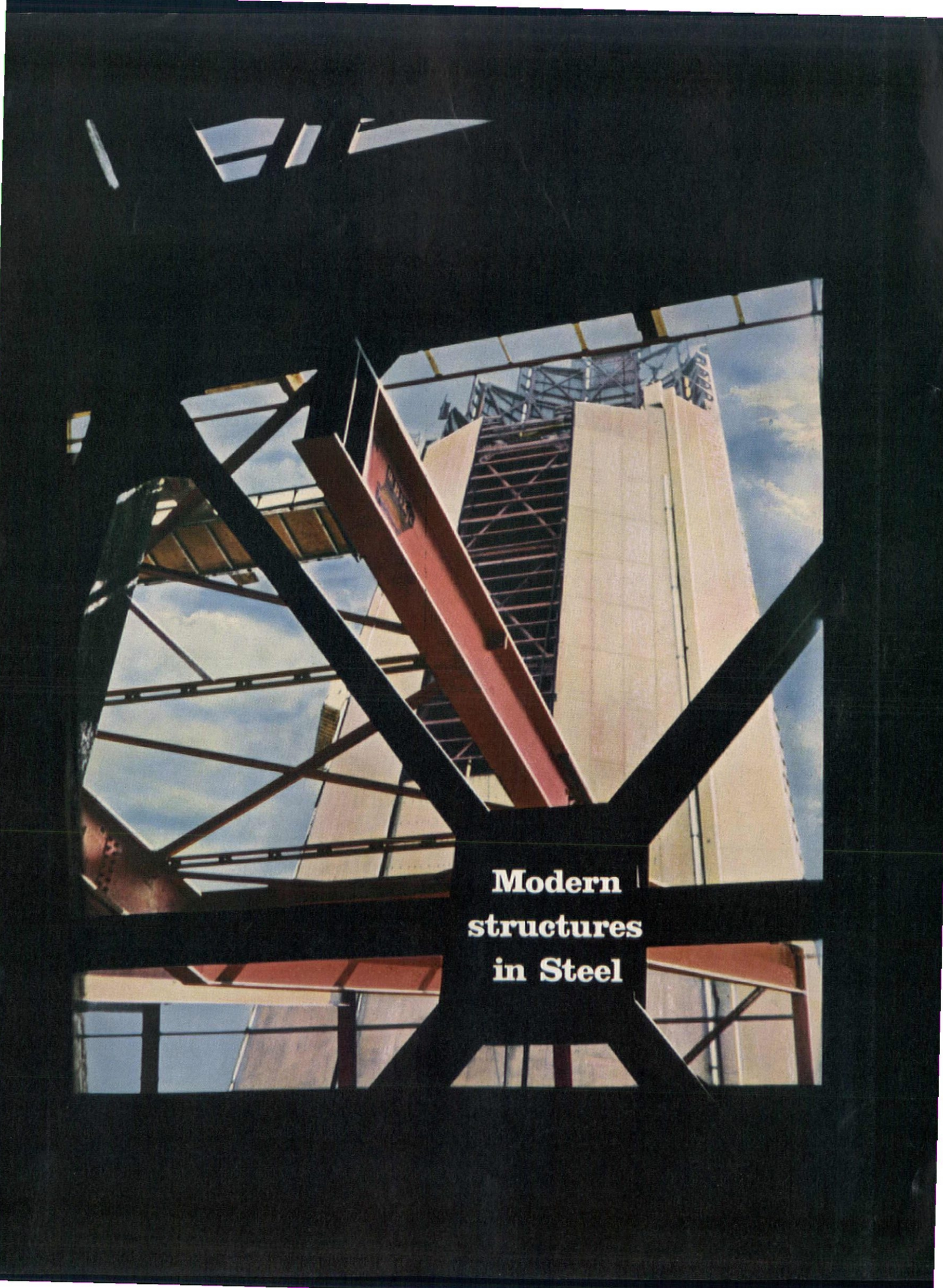
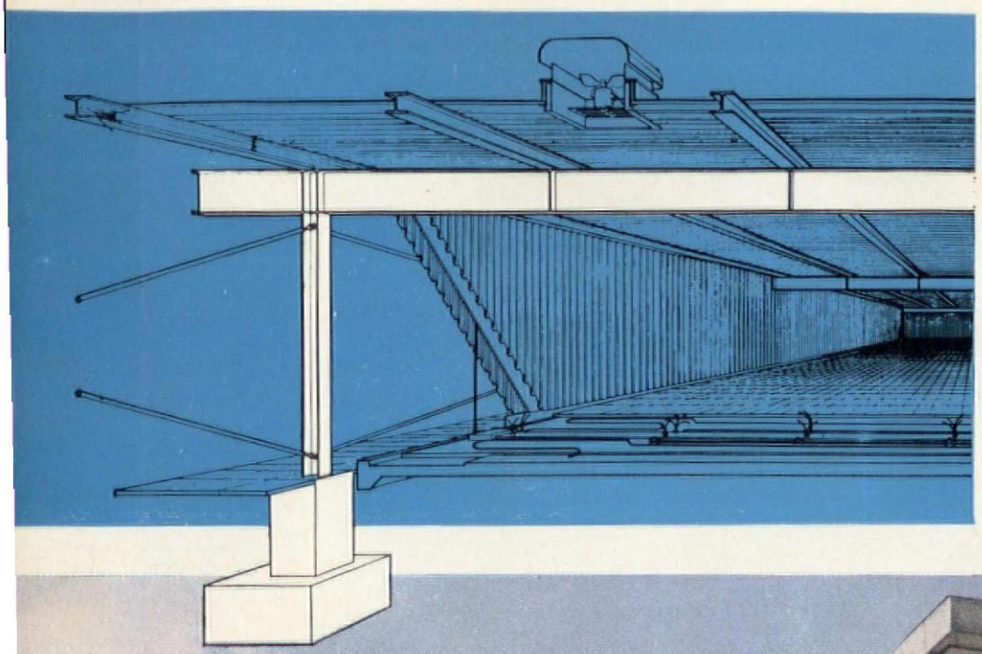


Modern structures in Steel

Functional design on a low budget

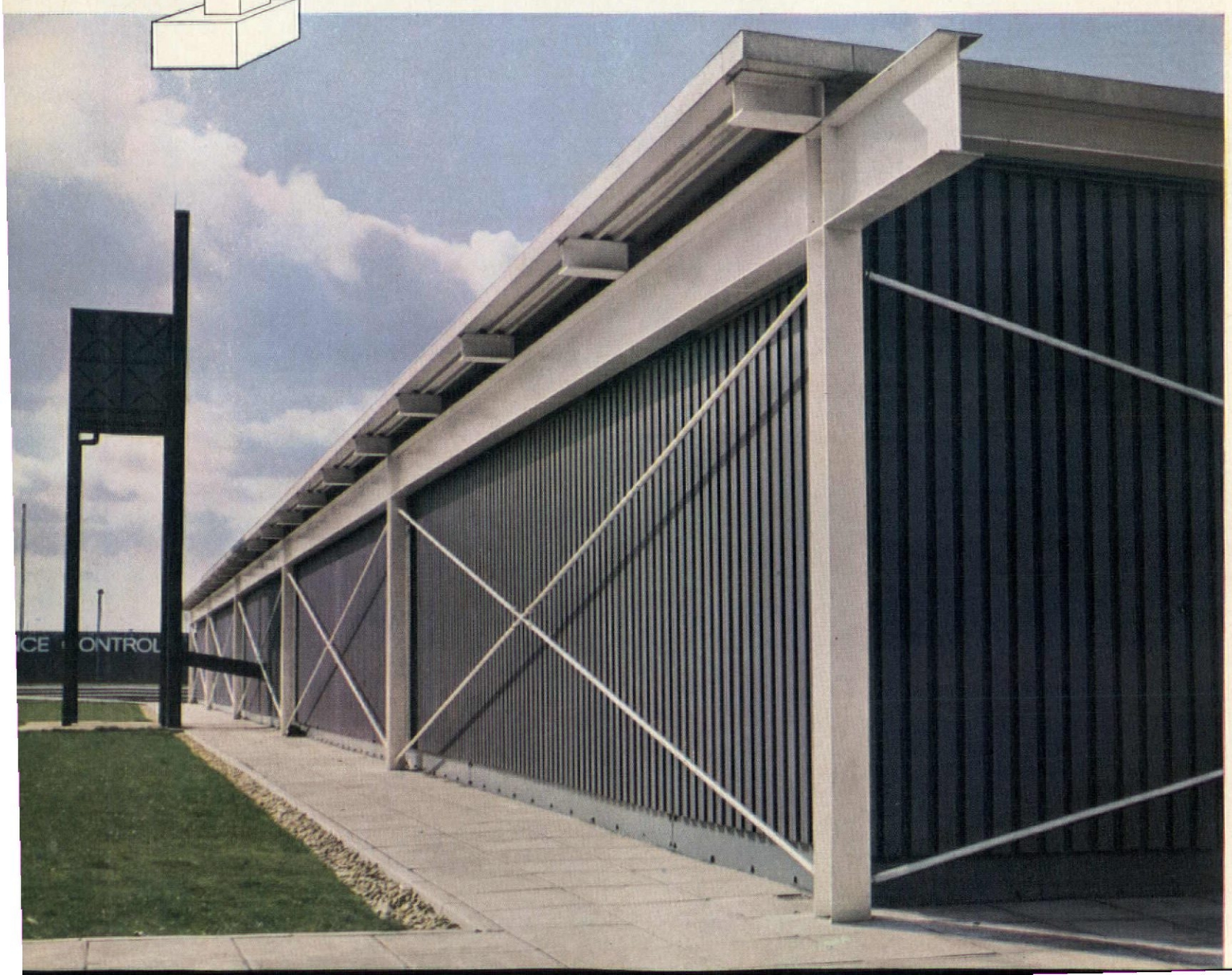
Steel-framed, steel-clad electronics factory

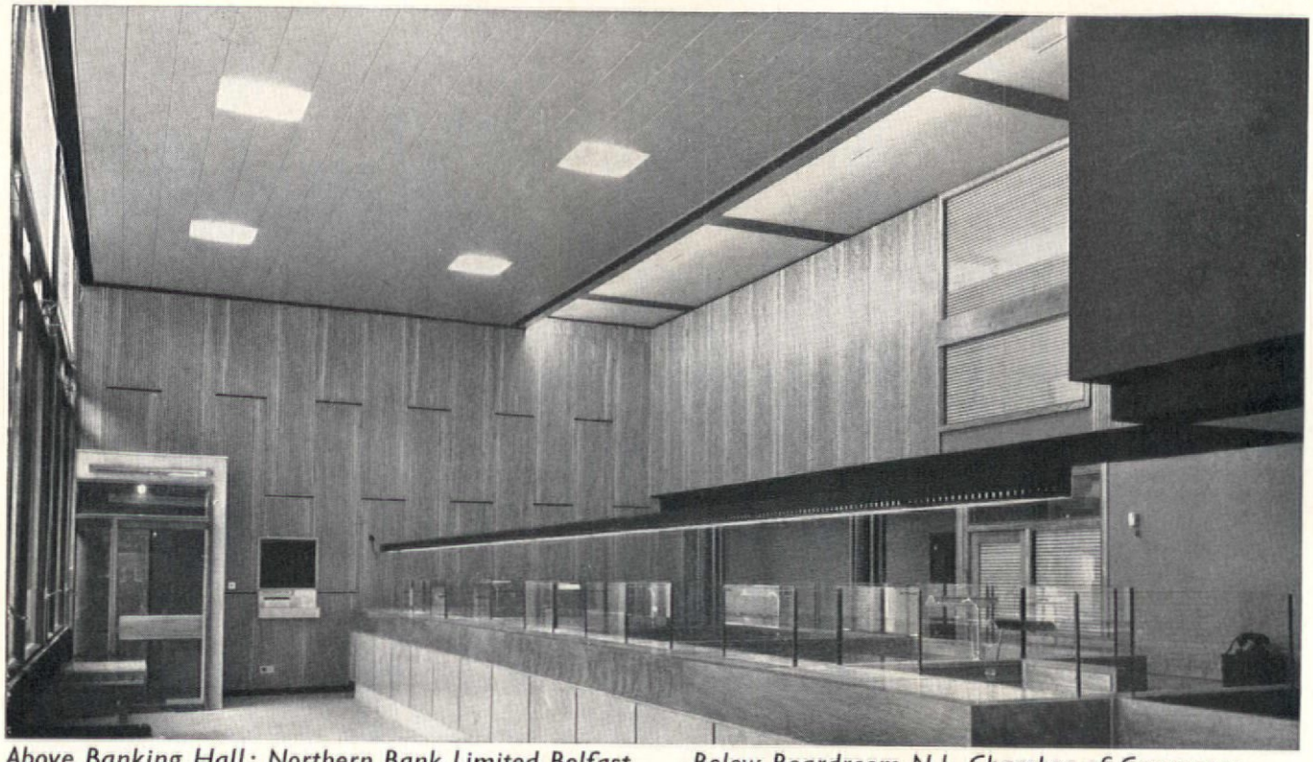


This remarkably economical project represents something of a break-through in industrial architecture. Its simple yet attractive design heightens the linear nature of the structural material its design group have employed throughout—*steel.* A functional solution was achieved working to a pressing 9-month schedule and a brief which required building cost to be *under* £3.10s. sq. ft. Speed in design and construction work, and provision for future extension and change, were aided by the choice of steel framing and maximum use of standardised elements. Plastic-coated galvanised steel sheet gives corrosion protection and a maintenance-free exterior colour finish to corrugated double-skin wall cladding. Full storey height panels are 12 ft high without intermediate support. Insulated steel deck roofing of similar trough section neatly recesses tubular fluorescent lighting and power feeds to ventilator fans.

Services: These are integrated within the fabric of the building and along a central underfloor service trench, giving complete flexibility of planning and clean uncluttered interior. **Structural frame:** Steel Universal columns were erected with shop-welded 9-ft cross heads, and centre beam sections were temporarily bolted before site welding to produce continuous beams. Perimeter columns and diagonal tubular steel wind bracings are deliberately exposed as part of the design.

Electronics Factory at Swindon, for Reliance Controls Ltd. Design Group: Architects: Team 4—N. Foster, W. Foster, R. Rogers. Consulting engineer: Anthony Hunt. Quantity Surveyors: G. A. Hanscomb Partnership. Services: G. N. Haden & Sons Ltd.





Above Banking Hall: Northern Bank Limited Belfast *Below Boardroom N.I. Chamber of Commerce*
Architect: Hugh McIlveen MA ARCH (Hons) DA (Edin) ARIBA *R Ferguson and S McIlveen*

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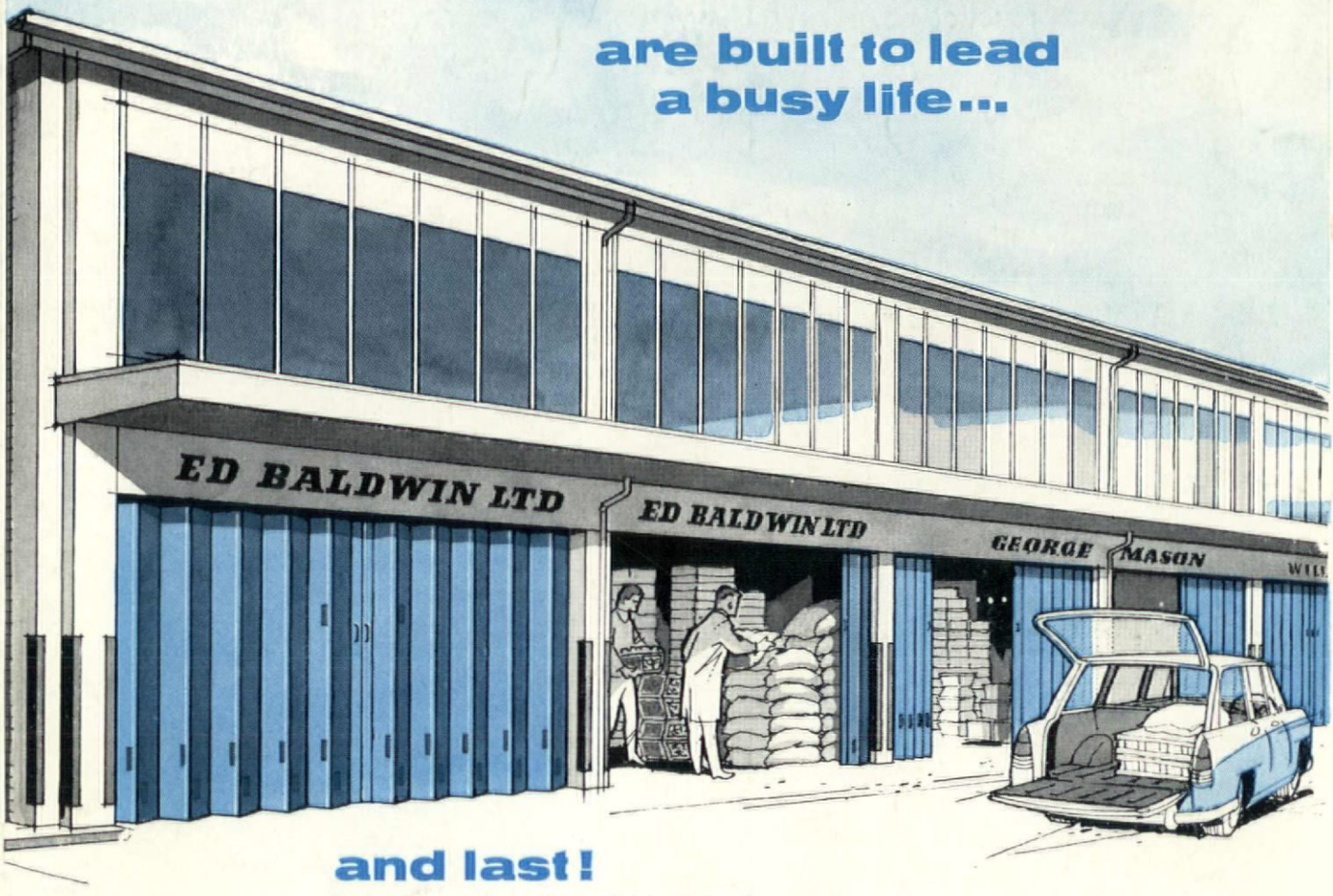

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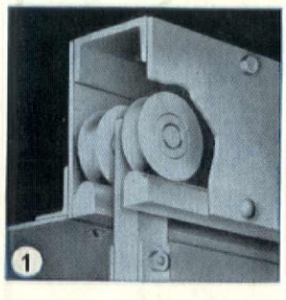

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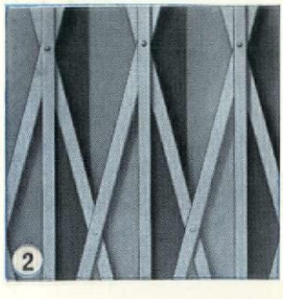

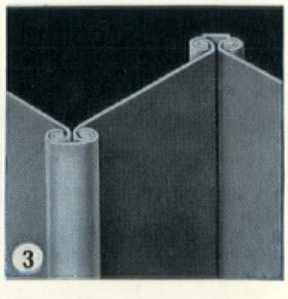

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