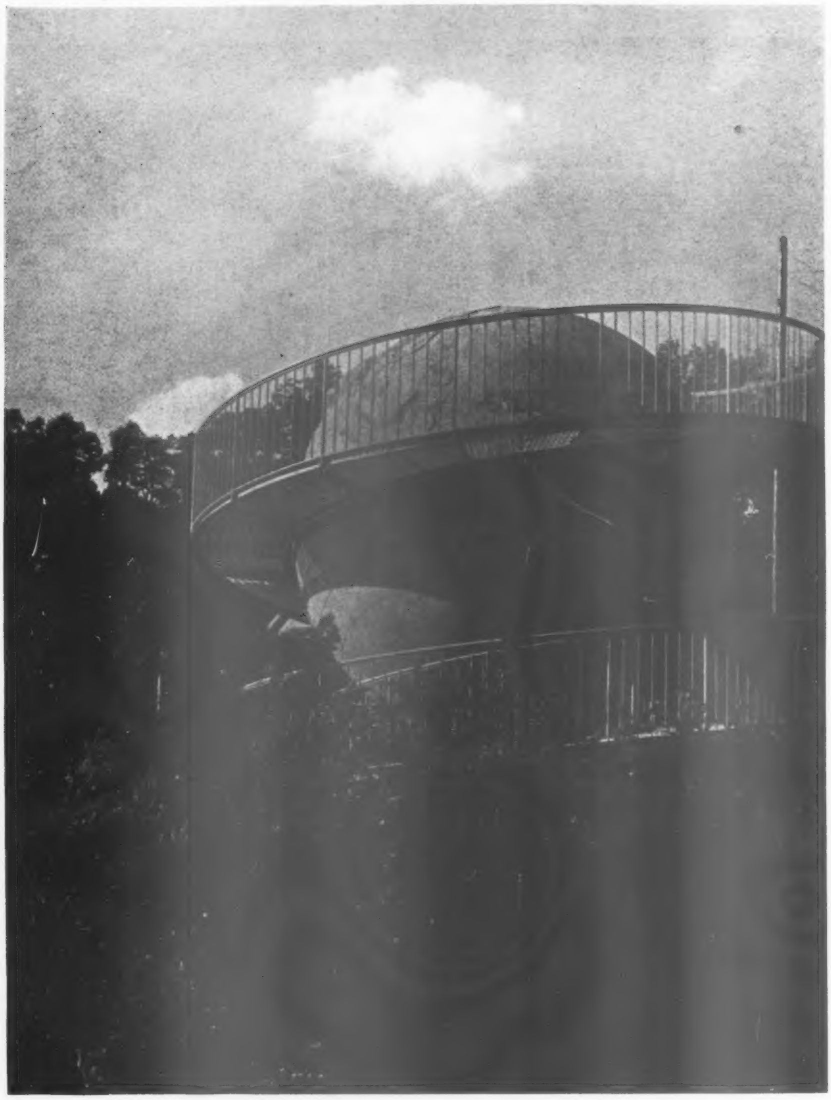
LOOKING FORWARD

A detail of a bronze figure adjoining an angle of the Katerina Nya Realskola at Stockholm. The architect was A. Hedquist.



THE NEW EDUCATION

The photograph shows the reinforced concrete globe in the grounds of the open-air school at Suresnes in France. The continents are in low relief and coloured, and the parallels and meridians are incised. The ramp stands out some 6 ins. from the globe, and the supporting channels are placed at otherwise uninteresting places in the oceans.

THIS ISSUE

DURING 1933 this JOURNAL preceded the Government's measures to deal with the slum problem with a slum campaign. In 1934 general discussions concerning the best type and construction of urban housing led to the publication of our issue on flats. Today, there is evidence that the Government is about to give its attention to the serious deficiencies in the amount and kinds of school accommodation. And the JOURNAL has therefore prepared the present issue in an attempt to summarize existing conditions in all that concerns school buildings.

As the architect turns the pages of this issue, two characteristics will probably be obvious to him. The one, that very few British schools are illustrated ; the other, that no mention is anywhere made of the planning or architecture of public schools—in the special British sense of that term. Both these omissions are the result of deliberate intention.

In a single issue of a journal, even in a double issue such as this, it is far beyond possibility to include every type of school building; far less is it possible to illustrate each type in its relative importance. Immediately such an attempt is imagined, the difficulties of choosing a standard of comparison are clear. Shall the standard be architectural merit, the numbers of children attending each type, the progressiveness of the educational policy pursued, or suitability in the essential matter of school sites? To decide arbitrarily amongst those standards, to choose and illustrate a dozen schools by one or other of them, would be, it has been felt, to miss all that is really significant in schools today, to achieve as a result a sketch both insipid and unrepresentative and to forfeit the chance of emphasizing, however poorly, that which is really essential in contemporary schools.

The final choice of State-aided schools in this country, and their equivalents abroad, as the only buildings to be illustrated in this issue was made on several grounds, of which numbers of children attending was only one. It was considered that the children at other types of school, a negligible proportion of the whole, had at least full opportunities, whether or not they were encouraged to make use of them, of developing a well-balanced attitude of mind and bodily physique outside actual school hours—either at school or in the holidays.

A great proportion of the children attending State day schools have not these opportunities. The huge numbers who leave school at 14 are dependent for nearly all their ideas on the care, use and development of their minds and bodies, for their wider conceptions of the art of living, on how they are guided during the nine years of compulsory education.

It is only since the beginning of the century that this responsibility has begun to be appreciated. It is not yet fully realized. The attitude that in providing for elementary school children a weatherproof roof, partial heating, and some drilling in the three "R.s," the State is really doing them quite well, is not yet dead amongst sections of the public who might be expected to know better.

Fortunately, the attitude has been dead in the educational world for many years, but the changes which that death involves are still being carried out, and are being carried out too slowly.

The central fact in State education today is this great change in educational policy; which, in turn, demands fundamental changes in school buildings and in the attitude of mind of those who design them. But meanwhile the conservative mechanism which controls the building of schools in Britain continues, and buildings which are out of date before they are opened are still being solidly and lastingly built.

The changes in educational policy which have been described previously in this JOURNAL have not been confined to this country; they are world-wide. And with more flexible mechanism available for the building of schools, large numbers of schools in other countries have been built to fulfil this new conception of a school's needs. Some are good and some bad, but Britain is in a position to profit both by the triumphs and mistakes.

In addition, school architects here have constantly accessible illustrations of nearly all the schools built in this country; but very rarely do architects outside London possess any easy means of examining work done abroad.

It is for these reasons that the majority of the buildings illustrated are foreign, even though progressive British schools have been neglected to make way for them.

It is hoped that the examples shown will emphasize the seriousness of the problem now before school architects. As a question of accommodation alone this country needs school extensions in two directions : to provide a system of nursery schools for all children from two to five, and a reduction of grotesquely unwieldy classes of 50 children to a maximum of 30 per class. This in itself is a large programme, but it is not the most important.

The fundamental need is for schools designed from the child outwards. Schools with large and pleasing sites, with a central and permanent assembly hall and library equipped as for use by intelligent adults ; having outlying classrooms in intimate relationship to neighbouring grass, flowers and trees ; and designed for the easiest possible extension or rearrangement. This need is not a visionary need of the future ; it is a present need, and it can be put into execution at once if education authorities decide that it shall be done.

The Architects' Journal
Westminster, S.W.1
Telephones: Whitehall
9 2 1 2 - 7
Telegrams
Buildable
Parl
London

NOTES & TOPICS

STORM IN A TEA-CUP

LAST July, the London County Council announced its intention to acquire some 30 acres of Hackney Marsh for housing purposes. Since then, much criticism has been levelled at the Council for even thinking of using part of this open space for housing.

*

Many societies joined forces to protest against the scheme, which one society stated to be " a deliberate breach of faith and a precedent that made every open space in London unsafe." A Hackney Marsh defence committee was formed ; questions were raised in Parliament, the Press and other places where questions are asked.

*

Last month the Council seemed to be fighting a losing battle. Its last chance to obtain the site was to promote a Parliamentary Bill ; this step was decided upon and the necessary action taken.

*

Now, the controversy is over. Everyone is happy. A fairy godfather (Mr. Villiers, the manager of the Eton Manor Club, one of the opponents of the L.C.C.'s scheme) has come along and settled the whole business. He has offered, at the request of the Minister of Health, to add to the Marsh suitable adjoining land and so free an equivalent area of the Marsh for housing purposes.

*

The Housing and Parks Committees of the L.C.C. have advised the Council to clinch the deal. The way is now clear for the Council's drive to rid the East End of its slum areas.

SEGREGATION FOR PLEASURE

At the C.P.R.E. annual meeting, Lord Crawford spoke with alarm at the encroachment of sea-front development on our few remaining rural coast lines. Fun fairs and amusement parks, holiday " camps " and bathing-pools, promenades and shelters, pavilions and piers . . . all repeat themselves in rapid succession as one travels round the coast.

*

Organized for " attraction " these seaside towns compete with one another in much the same way as the " go-ahead " shopkeepers of any suburban street, but with more devastating results to their neighbourhood. The South Coast, from Margate to Torquay, has already been called " Channel Street," but there are still a few open spaces left between the promenades and piers.

*

Local authorities now have the powers to schedule areas for development and areas for retention as open coast line. Apart altogether from questions of national duty and amenity, it would *pay* them to make sensible use of their powers.

DAWN OVER LEEDS

The critical remarks of Sir Frederick Marquis about lack of reality in the design of the Headrow at Leeds have resulted in a characteristically vigorous letter by Sir Reginald Blomfield to the *Yorkshire Post*, where he confines himself to a simple and straightforward statement of fact.

*

It appears that in 1928 Messrs. Lewis wanted a " Colossal order " in Portland stone ; more recently they seem to have preferred a flatter and more featureless variety of Oxford Street pseudo-classicism. So that Sir Frederick's realization that a building can be " representative of the age in which we live " and express " the purpose for which it is built " would seem to be of very recent date.

*

It is a sad story, but certainly not an isolated one. Realization is coming slowly but surely to a great number of industrial and commercial men. They, more than anyone else, have in the past encouraged, even demanded, the cloaking of their activities in columned and pedimented garments cut with a somewhat illiterate regard for the Renaissance, but with no appreciation of its spirit.

HONOURS . . .

One might almost call this a week of architectural honours.

. . . IN SOUTH WALES . . .

The South Wales architecture medal goes for the second time to Mr. Percy Thomas, this time for his Guildhall at Swansea.

*

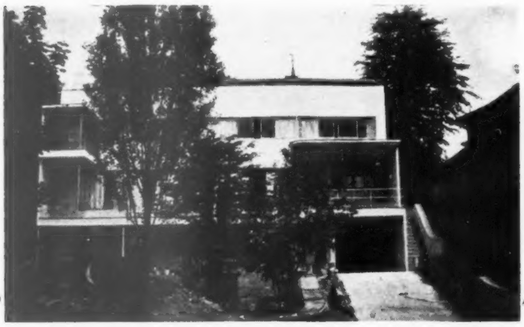
The jury had before it a record number of buildings and the standard of merit was high ; semi-finally, so to speak, they isolated the Swansea Guildhall and the Sully Tuberculosis Hospital, Mr. Thomas's building finally gaining the award by a narrow margin.

*

Most districts in the country now have these medals and most of them have attracted public attention by the fact that they have gone chiefly to commercial buildings. Indeed, a Town Hall has to be more than good nowadays to gain one of them.

. . . MANCHESTER AND . . .

Meanwhile, Mr. Charles Holden has been visiting his native Lancashire (it is nearly seven years since he won the London Architecture Medal), there to receive in Manchester an honorary degree. In distinguished company, too, including a fellow designer, Mr. H. N. Gresley, the



Three photographs taken last week-end in Frognal Way, Hampstead, N.W., showing, top, the site of the proposed house by Connell, Ward and Lucas, at the junction of Frognal Way and Frognal, and two views of the house in Frognal Way, designed by E. Maxwell Fry.

engineer responsible for the L.N.E.R.'s Silver Jubilee express locomotive.

. . . AND LIVERPOOL

While at Liverpool, Mr. Gordon Stephenson and Mr. H. S. Robson, both B.Archs. of the Liverpool School, learn that they have been awarded Commonwealth Fund Fellowships.

*

These are the only two Commonwealth Fellowships awarded this year for architectural research. Mr. Stephenson chooses for his research the study of American housing technique, with particular reference to mass production; while Mr. Robson is to study the urgent problem of the large centralized general hospital and its American solution.

RESEARCH

And talking of research fellowships reminds me that the value of research has long been recognized in our architectural schools, though how to tackle it and relate it to creative work has been more of a problem.

*

The Government has long had research stations; at Watford for building, Princes Risborough for timber, Teddington for science generally. Many branches of the building industry have set up their own laboratories, the British Colour, Paint and Varnish Manufacturers' Association being the latest converts to laboratory research.

*

Foodstuffs, milk, fabrics, indeed a vast number of general commodities are now subject to scientific research, and the time is fast approaching when some collating body for all this data will be essential . . . and then some revision in education to widen the field of use for the results of research in creative effort.

FUSS OVER FROGNAL

So Messrs. Connell, Ward and Lucas are in trouble again, this time over a job at the corner of Frognal and Frognal Way, to which various distinguished architects have taken strong exception.

*

As far as I can remember, Frognal Way has been developed piecemeal, and to design one building in keeping with all the others would present a pretty problem in the application of derived art. But it seems to me that the whole protest is bound to fail, simply because Mr. Maxwell Fry has already built a reinforced concrete house only two doors away.

*

And a very pleasant house, too, as far as I can see from the photographs, two of which are shown on this page. But *whatever* the Connell, Ward and Lucas design is like, I don't see how it can be disapproved of just because it's concrete.

MORE ABOUT SILENCE

The National Physical Laboratory is still pegging away at the noise problem, and the 1935 report is fairly encouraging. It is tacitly admitted that there is still nothing available to stop transmission of noise through floors in low-rent flats, but the report ends with the pious hope that something may be done about it one day.

*

The floating floor, mounted on loaded rubber pads, works well enough, of course, but costs are far too high for rehousing work. And even if floors and walls are soundproof there still seems no way of defeating those amiable humorists who make a hobby of playing tunes with a hammer on their radiators.

ASTRAGAL

This being a special issue of the JOURNAL, *the usual features of Town Halls, Working Details and Trade Notes have been held over, and will be resumed in next week's issue.*

NEWS

POINTS FROM THIS ISSUE

"*I would make it a capital offence for the capitalist to convert even the smallest beautiful building into a commercial proposition*" 794

"*The controversy over the building on a portion of Hackney Marsh has now been settled*" 795

"*Fully half the school buildings of Britain are unsuited to, and cannot be made suitable for, the new education*" 797

"*Real learning requires the personal response, which only comes when the learner is tackling something that has value for him on his own level of experience*" 853

RECONSTRUCTION OF THE SEA-FRONT AT BRIGHTON

Today, the Brighton Town Council will be asked to sanction the scheme for the reconstruction of the entire sea-front between the West Pier and the old Ship Hotel. The scheme, which has been prepared by the Borough Surveyor (Mr. David Edwards) and Professor S. D. Adshead, is estimated to cost £295,000, and, if approved, the work is expected to begin in October, 1937.

SOUTHEND TOWN HALL

Mr. E. Vincent Harris, F.R.I.B.A., has been selected as architect of Southend Town Hall, which is estimated to cost £350,000.

KING GEORGE MEMORIAL AT WINDSOR

The Committee appointed last March to consider the form of a memorial to be erected in Windsor to King George has decided in favour of a memorial upon the recently cleared area below the Castle walls at the junction of Thames Street and the Datchet Road.

A well-known architect is shortly to be asked to prepare a design. The estimated cost of the scheme is £3,000.

SCHOOL ARCHITECTURE

Lord De La Warr, Parliamentary Secretary to the Board of Education, speaking last week at the opening of a school at Rochester, pointed out that a very gratifying change had been taking place in the character of school buildings. He said: "Our new schools are vastly better than the old—could they be still better? In saying this, I mean no criticism of the architect—in the past, until very recently, he has been told to produce so many cubic feet in so many rooms at the lowest possible cost. Actually, good architecture is not necessarily the most expensive. But even if it were, I would be prepared to argue that if we can afford to teach art in the schools we can afford not to destroy every artistic feeling by teaching it in a building which is mediocre and dull. I would like to see public thought and interest—particularly that of the local authorities—aroused in this subject. We have got the architects in the country—they only need encouragement and support from those who employ their services. They should be made to feel that a piece of individual work is not a crime against convention but an attempt to make their own contribution to a problem—a contribution which will be judged without prejudice against anything that has not been done a hundred times before.

"When we were absorbed by the problem of housing, I remember that there was a national competition for architects to produce plans of various suitable types of houses. A great deal of building of schools is going to be carried out in the near future. Why should not the same thing be done in regard to the school building? It is hardly the function of the Government to do this, but if some public-spirited body or individual would put up sufficient money for the premium and the expenses, not a very large sum, I am in a position to undertake that the Board of Education would do everything in their power to assist the success of such an effort. It is certainly worth doing. It would draw from architects new ideas, and it would lead, first and foremost, to yet greater interest in the improvement of the school as a school, but it would lead also to an increase in the number of public buildings of which our people and our country could be justly proud."

THE ARCHITECTS' DIARY

Thursday, May 28

ROYAL ACADEMY EXHIBITION, *Burlington House, Piccadilly, W.1. Summer Exhibition. Until August 3.*

ROYAL INSTITUTE OF PUBLIC HEALTH AND INSTITUTE OF HYGIENE. *Annual Congress. At Edinburgh. Until May 30.*

ARCHITECTURE CLUB. *Twenty-sixth Dinner to be held at the Savoy Hotel, W.C. Subject for discussion: "The King's Highway." Speakers: Sir John Squire, W. Rees Jeffreys, and Sir Charles Bressey. 7.45 p.m.*

ARCHITECTURAL ASSOCIATION, 36 *Bedford Square, W.C. Annual Reception. 8.30 p.m.*

DESIGN AND INDUSTRIES ASSOCIATION AND THE SOCIETY OF INDUSTRIAL ARTISTS. *At the Building Centre, 158 New Bond Street, W.1. Subject for Discussion: "The Design and Making of Pottery." Speakers: Josiah Wedgwood, Gordon M. Forsyth, T. A. Fennemore and J. F. Price. 8.15 p.m.*

Gordon Stephenson, B.Arch., A.R.I.B.A., of the Liverpool School of Architecture, winner of one of the two Commonwealth Fund Fellowships for architectural research. Mr. Stephenson will be attached to Columbia University and the Massachusetts Institute of Technology, and will devote himself to an investigation of American housing technique.

S.P.A.B.

Professor A. E. Richardson, A.R.A., speaking at the annual meeting of the Society for the Protection of Ancient Buildings, held in London on May 21, said it remained for the Society to combat that ill-advised spirit of progress which demanded the demolition of Waterloo Bridge and now threatened All Hallows, Lombard Street, E.C. The Adelphi had been swept into the dust; various other fine places had been pick-axed; Bath was threatened only recently; almost every small manor house within a radius of 30 miles of London was in process of conversion into shops. He would make it a penal offence for any architect to alter a building of beauty and a capital offence for the capitalist to convert even the smallest beautiful building into a commercial proposition! All Hallows could be repaired for £5,000; was it not better to keep a religious building where temptation was most rife than to build others where people slept?

ARCHITECTURAL EDUCATION

Sir Percy Worthington, in an address to the students of the Municipal School of Architecture when he opened an exhibition of their work in the School of Art, All Saints', Manchester, last week, said that an exhibition of this kind raised the question of the future of architecture. Modernism, as it was known today, would be ancient history in 25 years, and it was to be hoped there would be sane development. The chaotic state of things that obtained today must somehow settle down into sanity.

It was manifestly impossible to turn a student loose in a school to evolve from his inner consciousness something entirely fresh. There were certain fundamentals in architecture that had existed in all civilized times. Interpretations might vary widely, but something fundamental ran through the whole, and it was upon this that their work should be based. The sequence of study was of great importance in a school of this kind. Functional architecture was the outcome of a new use of old material, and in its extreme form meant the abandonment of craftsmanship. Concrete was mixed by machine, and the mind which directed it was that of an engineer. "Is the architect going to sit down under that sort of thing?" he asked.

"Your object is to see that the principles of beauty are not forgotten. You must not therefore be impatient if you are put to study what you may consider antiquarian lumber. Learn all you can and apply it to new conditions. Shear off everything superfluous if you like. A building like Mr. Holden's Underground headquarters in London may already appear old-fashioned to you, but you can learn from it balance of mass, fenestration, and emphasis—even though he has been badly let down by his sculptors!"

"CRUDE BUILDINGS"

Protests against the type of buildings constructed by the Department of Agriculture on small holdings adjoining main roads were made at a meeting of the works committee of Dundee Town Council last Thursday (states the *Scottish Daily Express*). When the Committee was asked to approve of plans submitted by the Department for the erection of cottages at Kingsway West, Councillor William Black said such buildings might be all right in some desolate glen where they would not be noticed, but they should not be allowed in a city like Dundee.

"The Board of Health insists on varied designs and elevations in housing schemes and yet the Board of Agriculture come along and put down buildings like this," said Councillor Black. "There are no cruder buildings in the city," he added.

The Committee decided to ask for a conference with representatives of the Department of Agriculture with a view to securing improved designs.

PRIVATE ARCHITECT FOR L.C.C. SCHOOLS

The Education Committee of the L.C.C. has been recommended to employ a private architect for a senior elementary school, as an experiment. A similar authorization has been given for designing a junior elementary school and a central school.

WELSH SCHOOL OF ARCHITECTURE

A party of students and staff of the Welsh School of Architecture, the Technical College, Cardiff, visited London on May 15. In the morning they inspected the Building Centre under the guidance of the director, Mr. F. R. Yerbury. The party then visited the Architectural Association School of Architecture, where they were the guests of the A.A. at lunch, after which they inspected the premises and viewed an exhibition of the work of senior students. In the afternoon the new headquarters of the R.I.B.A. were inspected under the guidance of Mr. E. J. Carter, R.I.B.A. Librarian.

BUILDING RESEARCH TECHNICAL PAPER

A Building Research Technical Paper dealing with the carbonation of unhydrated Portland cement was issued last week by the Department of Scientific and Industrial Research. Copies are obtainable from H.M. Stationery Office, price one shilling.

H. S. Robson, B.Arch., A.R.I.B.A., of the Liverpool School of Architecture, who has been awarded a Commonwealth Fund Fellowship. Mr. Robson will be attached to Columbia University, and his subject of research will be the large centralized and general hospital as it has developed in America.

DESTRUCTION OF BED-BUGS

The Minister of Health has issued a Circular (Circular 1544) to local authorities stating that he considers it undesirable that orthodichlorbenzene should be used for disinfesting inhabited houses from bed-bugs, pending further scientific inquiry into the question of its possible harmfulness.

HACKNEY MARSH

A solution has been found to the problem of the 30 acres of Hackney Marsh which the L.C.C. wished to take for housing, a proposal that has been strongly opposed. The Council will use 20 acres for housing, and the same area of adjoining land, now in private occupation, will be added to the Marsh. The cost of the exchange is estimated at £90,000.

Full details of the scheme were given in the House of Commons last week by Sir Kingsley Wood, the Minister of Health. Reference to his speech is made in the Parliamentary News below.

IN PARLIAMENT

Hackney Marsh

In the House of Commons on May 22 Sir Kingsley Wood indicated, in a reply given last Friday to a question raised by Lord Winterton, that he had been giving anxious attention to the proposal of the London County Council to use as a housing site a portion of Hackney Marsh. Sir Kingsley explained that he had been considering the matter not only from the point of view of housing, but also because he would regard with grave concern any reduction in the area of land dedicated permanently as an open space. Accordingly, he invited Mr. Villiers, who as a manager of the Eton Manor Club is interested in the question of Hackney Marsh in view of the voluntary work carried on by the Club in the neighbourhood, to confer with him, and Mr. Villiers has, at his request, made an offer on behalf of the Club which seems likely to afford a solution of the problem that will be satisfactory to all parties. This offer has been commended by the Minister to the sympathetic consideration of the London County Council.

The offer made by Mr. Villiers is that the London County Council should acquire from the trustees of the Manor Charitable Trust certain lands which are owned by the Trust and adjoin Hackney Marsh. The total area of these lands is just over 20 acres. It is proposed that when they have been acquired by the London County Council they shall be added to Hackney Marsh and dedicated permanently as an open space. The London County Council will then be able, without legislation, to arrange for the use, for housing purposes, of a corresponding acreage of the land now forming part of Hackney Marsh upon which it desires to build, as it has power under the London Open Spaces Act of 1893 to exchange land forming part of Hackney Marsh for any other land adjoining the Marsh.

These proposals appear to offer a satisfactory solution of the whole problem. Under them the London County Council will be able to build on the site which is considered by the Council to be the best housing site available. At the same time a reduction in the area of the site to be developed from 30 to 20 acres will make it possible to maintain the remainder as an open space, an arrangement which will no doubt be much appreciated by residents in the immediate neighbourhood. Further the addition to Hackney Mars of the land to be acquired from the Trustees of the Manor Charitable Trust will ensure that there is no reduction in the total area of the Marsh.

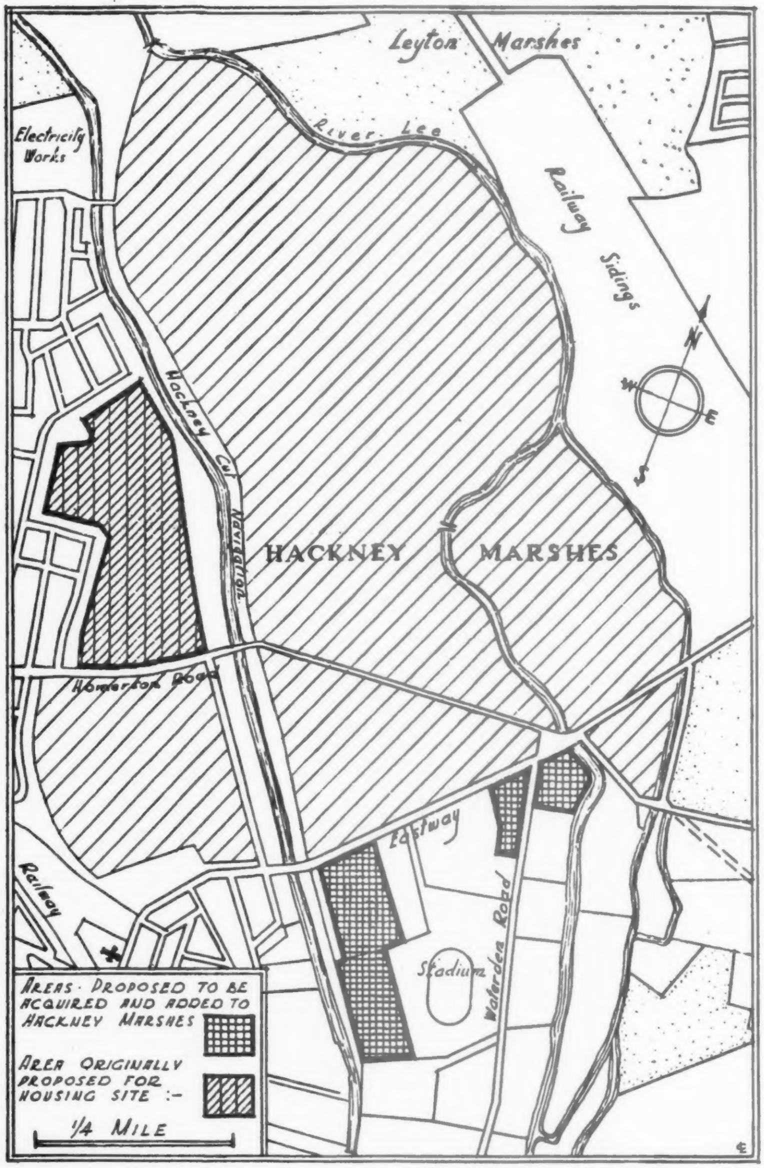
The letter addressed to the Minister by Mr. Villiers is printed below:—

THE MANOR HOUSE,
HACKNEY WICK, E.9.
May 21, 1936.

DEAR SIR KINGSLEY,

Following our recent conversation, I have been giving further anxious thought to the problems raised by the L.C.C. proposal to utilize 30 acres of Hackney Marsh to see whether there was any course which would maintain the view I have held as to the preservation of open spaces and at the same time help the Council to proceed with its reconstruction work to improve the housing conditions of many of the residents in East London. In this work it has my complete sympathy; and I have been anxious to put forward a proposal which would render the Council's problem less difficult of solution.

I have, in particular, endeavoured to see whether it would not be possible for the Council to acquire certain adjoining lands which could be exchanged for part of the Marsh under the terms of the Act of 1893.



The controversy over the question of building on Hackney Marsh has now been settled. On Tuesday last the L.C.C. agreed to purchase a portion of an adjoining estate (the crossed-hatched areas to the south), which will be added to the public open space, and to acquire for housing purposes land now forming part of the Marsh (the diagonal-hatched areas on the west).

In deference to your request, I put forward the suggestion that the Council should acquire lands on the south side of Eastway lying between the course of the River Lea on the east and of the Lee Navigation, etc., on the west. It happens that the Manor Charitable Trust own and has laid out for sports purposes an area of some 8½ acres at the western end of this territory; and it also possesses the freehold of some 6 acres immediately adjoining to the southward. These sites the Trust would be prepared to make available for the London County Council on terms which I have no doubt can be mutually agreed. The Manor Charitable Trust also holds option until the end of the year over two plots on each side of the northern end of Waterden Road at the eastern end of this area containing a total area of just over 6 acres; and I am prepared to facilitate so far as in me lies the acquisition by the Council of these two plots. These plots would cover a total acreage of just over 20 acres.

I hope that in the event of the Council acquiring these plots for the purpose of an exchange for an equivalent area of the Marsh and then using for building any part of the 30 acres in question, it will, nevertheless, be possible to leave a substantial portion of the 30 acres available for the playing of organized games by schoolchildren.

In making this suggestion I do so in the hope that it will form the basis of a practical solution of the difficult problem with which the Minister of Health is faced in seeing that more rapid progress is made with the improvements of housing conditions.

If the proposal should meet with your general approval, I should be prepared at once to discuss the details of the matter with you or your officials, or if it be thought more convenient, I would do so direct with the L.C.C.

Yours sincerely,

ARTHUR VILLIERS

The Right Hon. Sir Kingsley Wood, M.P., Ministry of Health, Whitehall, S.W.1.

Houses for Old People

Miss Ward asked the Minister of Health whether local authorities would qualify for the subsidy under the Overcrowding Act by erecting special houses for old people and using the houses vacated by these persons for housing people for whom accommodation had to be provided as a result of the provisions of the Overcrowding Act.

Sir K. Wood said that the Exchequer subsidy would be available for houses built in the circumstances indicated, if the conditions of the Act were otherwise satisfied. He referred to the desirability of building special houses for old people in a Circular which he issued in October last.

Housing Rents

Mr. E. Smith asked the Minister of Health if he would consider the need for a reduction in the rents of all working-class houses, including the abolition of the increase allowed on the pre-war rents, and introduce legislation amending the present Acts.

Sir K. Wood said that the Rent Restriction Acts still had more than two years to run and at present it would be premature to consider what, if any, future action might be required.

Houses at Low Rentals

Mr. Smith asked the Minister of Health if he would consider the floating of a loan, or take other steps, to enable a national housing scheme to be carried out for the provision of adequate housing accommodation for working people at rents of 10s. a week, and bungalows for old people at rents of 5s. a week.

Sir K. Wood said that this suggestion had been considered from time to time in the past. Local authorities were now actively engaged in providing low-rented houses in connection with slum-clearance schemes and schemes for the abatement of overcrowding, and were experiencing no difficulty in financing their operations at reasonable rates of interest.

R.I.B.A.

An exhibition of photographs organized by the American Institute for Persian Art and Archæology, including photographs representative of the latest work of the Institute's Architectural Survey, will be held at the R.I.B.A., from Tuesday, June 9, to Friday, June 26.

The exhibition will be opened at 3.30 p.m. on Tuesday, June 9, by His Excellency Hussein Ala, C.M.G., the Iranian Minister in London.

COMPETITION RESULT

Mr. Lionel H. Bucknell, F.R.I.B.A., the assessor of the competition for a new science block at the Bablake School, Coventry, has made his award as follows :

Design placed first : Mr. Herbert Jackson.

Design placed second : Mr. B. Tempest.

Design placed third : Mr. B. Whiteman.

The competition was limited to architects practising in the County Borough of Coventry.

FOREWORD

BY THE EDITOR

FOR a very long time, and certainly during the whole of that period loosely called the Victorian Age, it was the custom for publications connected with education to have bound up with them one or two sound moral exhortations. School books, even books for infants, abounded in morals, and by their determination to mould the young mind early and mould it right, perhaps earn a little forgiveness for what, to modern eyes, seems a universal and deplorable ugliness of presentation.

Nor, in those days, was youth encouraged to miss a sound moral deduction by any over-subtlety in its expression.

" Have you not heard what dreadful plagues
Are threatened by the Lord,
To him that breaks his father's law,
Or mocks his mother's word ?

What heavy guilt upon him lies !
How cursed is his name !
The ravens shall pick out his eyes,
And eagles eat the same."*

Such plain speaking was not likely to fail to have some message for the most backward toddler.

In those days this early emphasized definition between right and wrong was carried to its logical end with a considerable lessening of all schoolmasters' responsibilities. Children had to be educated, to be educated they were taught ; if they refused to be taught easily they were obviously too stupid or too wicked or both, and the appropriate remedy was readily forthcoming.

It was a simple world of education then. Education was book-learnt and teacher-taught on bad food and in classrooms badly lit, badly ventilated and rarely heated.

Today the work of the school teacher, the most responsible of all work, does not seem so simple to those who have undertaken it. Deplorably lacking in conviction of the divine right of the adult and the natural evil of the young, these men and women believe that education is more a process of skilled guidance than of instruction, and that the mental growth of a child is intimately related to its physical growth and health. And they have taken steps to carry theory into practice ; to see that the surroundings of education are healthy, and that physical activity receives as much attention as mental activity.

In this great change only one thing is lacking. Architecture, the most permanent of all the arts, has been disastrously permanent in school buildings. Relics of a past educational outlook, fully half the school buildings of Britain are unsuited to, and cannot be made suitable for, the new education. The changes in education have not yet changed the surroundings of education.

It is clear that the Government intends to encourage during the next few years the provision of school surroundings which have been made to the measure of the new education. And therefore the moral of this issue, if a moral is still permitted, is that architects should be ready for their opportunity. As a contribution to this readiness the following pages are put forward in which several authorities describe the changes that have taken place in educational policy, and which show some examples of schools recently carried out.

* *Divine and Moral Songs for Children.* Isaac Watts, D.D.

A: PAST AND PRESENT

THE SYSTEM OF
STATE EDUCATION

BY HARLEY V. USILL

Editor: The Educational Year Book

EDUCATION in England and Wales is governed by the Board of Education Act of 1899, and the consolidated Education Act of 1921. The function of the Board of Education is superintendence; it directs the course of education throughout the country, not by issuing orders to local education authorities or school managers, but by laying down the conditions upon which it will make grants. Thus, the main task of local authorities is to provide a system of education within their respective areas which will ensure the maximum grant from the Board of Education. To all intents and purposes, therefore, education is a matter for local government so long as the regulations for grants are obeyed.

These regulations fall into two main classes: those defining the amount of the grants, and those defining the conditions upon which they are given. "The Code of Regulations for Public Elementary Schools" was revised in 1926, and it is significant to note that provisions as to curriculum were eliminated in this revised code. This is in keeping with the policy of the Board to offer *suggestions*, but to refrain from any definite instructions on curriculum. The only regulation on the subject for elementary schools is that "the secular instruction . . . must be in accordance with a suitable curriculum and syllabus framed with due regard to the organization and circumstances of the school concerned." His Majesty's Inspectors of Schools may recommend the withdrawal of a grant if it is considered that this regulation is not being applied satisfactorily. This change of policy may be further stressed by reference to the regulations appertaining to school buildings and organization. Thus, up to 1926, the Code of Regulations for Elementary Schools, coupled with a separate Code of Building Regulations, attempted to lay down fixed minimum standards of accommodation. For instance, the code originally required that "the number of children on the register of any class or group of classes under the instruction of one teacher must not exceed sixty," and in 1924 the number was reduced to fifty. Meanwhile, however, the Board had *advised* local authorities that classes for children over 11 years of age should not exceed forty. Here is a frank recognition that a regulation defining the size of classes would act as a deterrent to progressive authorities. Local education authorities, therefore, are free to develop schemes according to local needs, and are subject only to the approval of the Board of Education for the purposes of grant.

Primary Education

(1) *Pre-School and Infant Education*

Post-war activity in education has led to an increasing interest in the nurture of the pre-school child. As a result, these all-important years are now receiving attention, and some provision for the child under 5—at present only permissive—is a part of the national educational system. The Education Act of 1918 contained provision for the erection of nursery schools, but owing to the need for retrenchment, little was done. There were on March 31, 1935, 65 nursery schools recognized by the Board of Education, accommodating 5,000 children. It will be realized that this number is totally inadequate to supply the real needs of the nation. It must be remembered, however, that there are approximately 120,000 children between the ages of 3 and 5 years in the infant departments of public elementary schools. In some areas separate babies' classes are to be found attached to these departments.

Average Number of Children on the Registers of Public Elementary Schools and some indication of the future falling population in Great Britain as a whole :—

		England and Wales	Scotland
1930	..	5,601,807	654,049
1931	..	5,596,744	656,899
1932	..	5,638,722	663,735
1933	..	5,698,383	669,621
1934	..	5,712,423	669,846

The Future:* No. of children *under 15* in :—

1931	10,825,072
1941	8,791,300
1951	6,621,200
1961	5,483,000

* Estimated by Dr. Grace Leybourne in the *Sociological Review* of April, 1934.

The first infants' school in Britain owed its origin to Robert Owen, who opened, in 1816, at New Lanark a school which resembled in many respects the nursery school of today. The original conception, however, was doomed to give place to a new type of school in which formal instruction was to be the main aim, although, from 1874 onwards, the introduction of kindergarten occupations did something to relieve the monotony of existing conditions. The Report of the Consultative Committee in 1905 on the conditions obtaining in infants' schools acted as a stimulus to change, and gradually the old *Galleries*, in which infants were herded together for the purposes of mass instruction, were removed and suitable furniture was provided, lesson periods were shortened, and teachers were encouraged to introduce a play element into work. The influence of the Froebel Society (founded in 1875), and, from 1919 onwards, of Montessori, entirely altered our whole conception of infant school education; and today these schools are an example of extraordinary progress, although in many respects their work is still hampered by the unwieldy size of the average class. On March 31, 1934, there were 6,314 separate infants' departments, containing over 720,000 children.

(2) The Junior School

The term *Junior School* means that part of the elementary school population which lies between the ages of 7 and 11. Under the old régime it was only a section of a school, since, under the three-decker building type of school, there was often no room on the upper floors for children between the ages of 7 and 8 years, so they remained on the ground floor. Leaving out infants, the Junior school was what the promoters of the Act of 1870 intended the elementary school to be, since the maximum age limit as proposed in the original Forster Act was 11. Under pressure, however, the age was fixed at 12, but there were so many exemptions for the older scholars that the leaving age was nearer 11 than 12.

Even when compulsory attendance came into force in 1876, the curriculum remained that of the Junior school, for the children in the early elementary school were bunched up in the lower standards, and as late as 1880 more than half the children in London schools (excluding infants) were to be found in the first two standards. Indeed, until the middle of the nineties when the annual examination was abolished, it was usual to find an enormous Standard I and a diminutive Standard VII. Although the Infants' schools, and later the Junior schools, have developed an independent character of their own, the Junior school is still very largely clouded by examinations. Subjects, such as arithmetic and English, which are easily examined externally, naturally tend to absorb the maximum of attention, for the Junior school children have, about the age of 11, to sit for a general examination set by the local education authority to select scholarship children for secondary schools. Whatever safeguards are taken, it is almost impossible to eliminate entirely the narrowing influence of these examinations upon the school programme.

Under the old system, a vast majority of children left school never having reached a higher standard than that of the Junior school. In 1926, however, the Report of the Consultative Committee on the Education of the Adolescent was published, which advised that, instead of the old vertical division separating two self-contained types of education, there should be a horizontal cut across the State-aided system, which would divide it into a lower group of schools ministering to the needs of infancy and childhood, and a higher group concerned with the needs of adolescence. It was recommended that the cut should be made between the ages of 11 and 12 ("11 plus"). The Junior school was then envisaged as a separate entity for all children between the ages of 7 and 11, and all children beyond this age group were to be automatically transferred to some form of post-primary education in *separate* departments and irrespective of mental attainment. The progress of reorganization was, however, seriously hampered by the economic crisis, but by March 31, 1934, the 7-11 age group was organized as follows :—

All-age Departments, 15,715.

Separate Junior Departments, 5,586.

Thus it will be seen that about one-third of the Junior schools have been reorganized on the basis of the Hadow Report.

" Teachers were encouraged to introduce a play element into work." The photograph shows this encouragement taken seriously in a nursery school in Vienna.

Post-Primary Education

At the age of 11 plus, there are several avenues open to every child. Through the medium of the Free Place Examination, the more academically inclined type of child can proceed to a State Secondary school to pursue a course of study leading to the School Certificate Examination at the age of 16 plus. A certain number stay on for advanced studies, and some of these eventually reach one or other of the universities. In some of our larger cities there are selective Central schools with a curriculum of a more practical character which cater for the type of child who is not likely to benefit by the more formal and academic character of the Secondary school curriculum. The remainder, where schemes of reorganization are in operation, proceed automatically to separate non-selective Senior schools, or to departments within the same building which have been adapted for the reception of 11 plus children. It will be seen that, after the academic type of child has been sent to Secondary or Central schools, the remainder will need a different type of curriculum, especially since promotion is by age and not as heretofore by mental attainment. In fact, as the result of reorganization, the backward or "C" child, as he is called, who had previously stagnated in the Junior school, has been rediscovered and presents a serious problem for the teaching staff of every Senior school. As a consequence, classes are now divided into "A," "B" and "C" streams, so that the needs of each stage of development can receive adequate attention. In the light of modern experience, it has been found that the old formal type of curriculum is useless, especially for the "C" group, and to-day, education in the senior school is of a much more practical character. But to perform this difficult task adequately, there is a crying need for a more generous staffing system, and much smaller classes. On March 31, 1934, there were 2,244 separate Senior schools out of a grand total of 17,959 departments in which there was accommodation for senior children.

Secondary Education

The present system of Secondary education had its origin in the Act of 1902. Since then the duties have rested on county and county borough councils "to supply or aid the supply of education other than elementary and to provide the general co-ordination of all forms of education." On March 31, 1934, there were 433,263 children in 1,381 grant-aided Secondary schools. This figure represents about 10 per 1,000 of the population.

In 1909, 695 boys and 361 girls proceeded to a university from grant-aided Secondary schools, and in 1934 the numbers had risen to 1,983 boys and 861 girls, and of these 1,531 boys and 678 girls received scholarships. Thus, every year about 2,800 children mount the ladder to the universities through the medium of the State system of education. In addition to the grant-aided schools, there are 393 schools (33,399 pupils) recognized as efficient by the Board of Education; 211 schools not on the official list (List 60) of the Board of Education (1,200 pupils), and approximately 8,500 private schools of varying types of efficiency with about 300,000 pupils. There is a bill about to be introduced into Parliament to give more powers for the supervision of this group of private schools, many of which it is thought ought to be closed.

Further Education

In the early years of this century the Board of Education were endeavouring to focus the educational energies of the

PRESENT DIVISIONS OF STATE EDUCATION

I. PRIMARY EDUCATION

(1) NURSERY SCHOOLS

(Age : up to 5 years)

Compulsory education begins at 5 and finishes (at present) at 14. Permissive legislation, however, allows Local Education Authorities to build Nursery schools for the pre-school child. Such children may also attend normal Infants' schools, to some of which are attached special babies' rooms.

(2) INFANTS' SCHOOLS

(Age : 5 to 7 plus)

At the age of 5, all children must begin nine years of elementary education. Attendance officers are responsible for seeing the law is obeyed, either by attendance at state schools or by the provision of instruction in private schools or at home. In the latter case, however, instruction by parents is not considered as an adequate substitute for a state or private school.

(3) JUNIOR SCHOOLS

(Age : 7 plus to 11 plus)

The Hadow Report, published in 1926, recommended that the schools should be so reorganized as to allow of separate Junior and Senior schools, with a break at the age of eleven. Where such reorganization has taken place, children proceed from the Infants' school to a separate Junior school. Where reorganization has not taken place, they proceed to a Junior Department of an all-department Elementary school.

II. POST-PRIMARY EDUCATION

(Age : 11 plus)

Before the publication of the Hadow Report only the academically inclined pupil received any special form of post-primary instruction, since promotion was based solely on attainment restricted almost exclusively to the three " R's ". This Report, however, recommended that *all* children on reaching the age of eleven should automatically proceed to some form or another of post-primary education, irrespective of backwardness in normal school subjects. These proposals necessitate considerable reorganization of existing school buildings and staffing arrangements, and certain Local Education Authorities have not yet put the suggestions into operation.

State Secondary Schools

Pupils proceed to these schools as the result of examinations which are usually taken at the age of 11.

Universities and Technical Colleges or jobs.

Selective Senior or Central Schools

Children who have missed the Secondary Schools may, in areas where such provision has been made, proceed to a Selective Senior or Central School, where the curriculum is less academic than that of the Secondary School.

Technical Education or jobs at the age of 15 plus.

Non-Selective Senior Schools

All other children proceed (where reorganization has taken place) to Non-selective Senior Schools or departments, at the age of 11, irrespective of mental ability. Where reorganization has not taken place, children are recruited from the Junior schools according to mental ability, and after the cream has been skimmed by the Secondary or Selective Senior Schools.

To jobs at the age of 14 plus.

country on Secondary education and were consequently unwilling to aid any type of training in the daytime definitely related to industry or commerce. In 1905, however, this attitude was modified, resulting in the establishment of " technical day classes " for boys and girls who had left the elementary schools. Evening instruction for boys and girls leaving the elementary day school has been an important feature of public education since the establishment of the School Boards. The Act of 1918 gave authority for the establishment of Day Continuation Schools which required all young persons between the ages of 14 and 18 to attend such continuation schools, on such days, and at times between 8 a.m. and 7 p.m., as the local education authority should determine, for 320 hours per annum. The scheme failed, since there arose a general impression that these schools would handicap young people seeking employment.

In 1904, the Board of Education issued, for the first time, regulations for " evening schools, technical institutions and schools of art, and art classes." There is little doubt that the Great War led to a wider recognition of the importance to industry of technical education, but unfortunately financial stringency has prevented local authorities from embarking upon many schemes of building which are necessary for the better conduct of technological and commercial study. Generally speaking, technical education has lagged behind that of the Continent, but if the Government is able to fulfil the promises contained in its educational manifesto, there is a distinct hope that the future will see a considerable advance in this important branch of education.

Raising the School Leaving Age

The Bill at present before the House of Commons to raise the School Leaving Age to 15 may have become law by the time this article appears. Many people fear, however, that the exemptions clause will nullify its real intention.

" Black List " Schools

A : Worst cases which should be closed.
B : Improvements can be made.
C : Numbers should be reduced.

	A	B	C	Total
Original totals, 1925 ..	679	1,766	382	2,827
Removed from List by December, 1934	469	1,004	180	1,653
Total remaining on Black List ..	210	762	202	1,174

Nos. removed annually.

1925 ..	25	1930 ..	206
1926 ..	101	1931 ..	145
1927 ..	233	1932 ..	154
1928 ..	277	1933 ..	114
1929 ..	326	1934 ..	72

A : PAST AND PRESENT

CHILDREN AND ARCHITECTURE

BY KEITH STRUCKMEYER

Director of Education, Wiltshire

PRACTICAL educationists do not as a rule trouble much about definitions. The work of the schools is capable of proceeding, changing, developing, successfully without its aim ever being clearly stated. The fact is that there is not one but there are many aims. Yet, for the purpose of this article, it may be well to attempt a definition of that in which the function of education consists. I conceive that the one true aim in all we do is *to provide conditions that are favourable to growth*. Any all-embracing definition of this extremely ambitious undertaking that we call education must stop short at this. Moreover, the sense of the terms used in this definition must be as unlimited as the definition itself. What " conditions " ? All conditions : first the personal influence of parents and teachers ; secondly, the physical environment ; thirdly, the arrangements for the conduct of the school ; fourthly, the activities pursued in the school, and so on. What " growth " ? All growth. Not only the growth of the child as an individual, but also the growth of children as a community. The being of the child contains the being of humanity, it contains the being of the nation to which he belongs, and it contains the being of the community in which he lives. Nor should we determine, with our limited intelligence, what that growth shall be. That is for the life, that is within the child, to decide ; it is for us to watch and provide.

So much for our ideals. In practice, we move painfully, one step at a time. Yet, if there is any department of education in which it is fatal to see only the step immediately in front of us, it is in the department of school building. So long as the present organization of our economy lasts, a school building of " permanent " construction will remain in use for a hundred, or two hundred, years. The present system of public education in England has been in force for less than fifty years. During that short time the requirements of school planning have fundamentally altered. How, then, are we going to build for the present, without damning the future ?

One of the discoveries of the present age is that the needs of the future will be different from the needs of the present, and that it is the duty of those who plan now to leave as few obstacles as possible in the way of those who plan hereafter. The essence of modern planning is to provide in advance the means of adaptation to the future. There is profound wisdom in this. The human being is beginning to realize that there is something in evolution that is infinitely bigger than anything his own mind can conceive. What is important is not to reach perfection in any one thing, but to leave the way open for continued growth. This point of view was impossible centuries ago when those who planned were under the spell of a delusive perfection, and when churches and palaces expressed an order that was given from above and imposed by the rules of religion or of society. Hence the emphasis on symmetry. The order of the school comes from within and is still in process of evolution. Therefore, there are no fixed canons of school architecture, so far as design is concerned ; and therefore symmetry, as distinct from balance and order in design, is of secondary importance. So much the better. The school itself, like the children it provides for, is young and immature. But it grows, it is alive.

The aim of the administrator is that the school should be as free as possible to develop itself. Ideally, every school building should be a skin, or shell, that will change and grow, as the living organism within it changes and grows. How far can this difficult aim be achieved in practice ? A headmaster, having the point in mind, once told me that he thought all school buildings should be made of timber. Unfortunately, in this country at least, timber construction seems at present unsatisfactory. As far as I can see, there is one way, and one way only, of satisfying this, the main requirement of school building in all circumstances. It is to choose a site of sufficient area and of suitable levels to allow for all possible extensions. This is the absolute desideratum of school planning.

We may ask now whether there are any general rules, positive or negative, that can be laid down to assist the architect who designs a school building. We have suggested that there is no.

need for a school to be planned symmetrically. The psychological function of symmetry would be difficult to analyse ; but in attempting it we might learn a good deal about architecture. In so far as the elevations of buildings are concerned, it appears that symmetry is associated with an effect that involves, in the mind of the beholder, acceptance of a given order of things. A municipality will often prefer an elevation for its civic centre that is symmetrical, because symmetry appears to be a necessary condition of the effect of dignity. It is not that symmetry in itself confers dignity on a building, but it predisposes the mind to accept that existing order of things which it is the function of municipal dignity to emphasize. Now, this may, or it may not, be a desirable feature in buildings that house the various activities of an adult community, but the reasons that are valid for adults are not valid for children. Formerly, it was thought highly desirable that children should be made, by force if necessary, to accept the existing order of things. Nowadays, with deeper wisdom I fancy, we hold that children should as far as possible construct their own order, and that, while guided by Authority, they should discover for themselves and understand, instead of merely accepting and having imposed on them, the sanctions that constitute the order underlying their school community.

There is no reason therefore why a school building need be symmetrical ; for we do not wish to impose on the mind of the child an order of things that he is forced to accept. That does not mean that there may not be certain rules governing the balance, in design, of a school building. Every structure that is thinkingly designed has architectural significance. That significance is intimately connected with what we rather loosely call balance. What is important is that the kind of significance expressed in the design of a school should be the right kind of significance, that is to say helpful, and not merely helpful but important, for the activities of the school, and that there should be a certain simplicity and inevitability in the design expressing it.

What a building "gives out" is exactly what the architect "puts in." It is not always what the architect intended to put in, but in so far as the building gives out anything at all it is what he, consciously or unconsciously, expressed in it. In education we are forced to assume that every part of the environment of the child may be either helpful or harmful. Our duty is to ensure that as far as possible it is the former, not the latter. So, we should provide that the influence on him of the building in which he is taught and in which he lives should conform to the values and principles of the teaching we give him. Just as the educator, in

"The effect of horizontality is to give a sense of freedom and space . . ." Classroom with sliding windows in the U.S.A., designed by Richard J. Neutra.

his approach to the child should discipline himself, as far as possible, to a standard of complete courage, complete sympathy and complete freedom, so also should the architect in his design of the school. The building that lacks courage is the sort of building that shelters behind massive entrances and other irrelevant incrustations or sacrifices, that subordinates the essentials of planning to the inessentials of symmetry and academic design. The building that lacks sympathy is the sort of building that displays that ruthless and sombre masonry that we have learned to associate with such dreary phrases as "mixed department" and "technical institute." The building *par excellence* that lacks freedom is that relic of Victorianism that masses instruction rooms stuffily together and yields no more to the breath of vitality within than it does to the beating of the wind and rain without.

So much for the approach to planning —but what, in detail, are the sorts of architectural values that are educationally significant? Foremost among these might be placed the horizontal motive in classroom design. The effect of horizontality in a room is to give a sense of freedom and space for the projection of our mental and physical activities. Psychologically, it acts as a corrective to the stress and strain of classwork. So long as our large classes persist, this liberation is of major consequence. Imagine the psychological deadweight, in former days, of a high unceiled room, with gothic rafters, filled with a class of seventy or eighty children. As a matter of fact, the double effect was probably so strong that the mind came round full cycle, and the children were simply unruly. That wasn't education and it wasn't architecture. In a modern building all this wastage is avoided ; for we have realized, or begun to realize, the effective importance in education of architectural values.

As another example—besides that of horizontality—of such values used to obtain a liberating effect on mind and body, may be mentioned the disposition of windows to the open air on opposite sides of a classroom. This, of course, is only possible where the entrance is at one end of the room and there are no corridors alongside—conditions that impose certain restrictions on planning, but are worth some sacrifice for the benefits, psychological and physical,

Secondary Schools (England and Wales)
Numbers and Pupils.

	1934	1933	1932	1931	1930
Estimated population	40,350,000	40,201,000	39,947,931	39,947,931	39,607,000
Nos. of schools ..	1,381	1,378	1,379	1,367	1,354
Pupils in grant-aided Secondary schools..	448,421	441,883	432,061	411,309	394,105
Per cent. per 1,000 of the population ..	11.1	11.0	10.8	10.3	10.0
Ex-elementary school-children in Secondary schools	335,435	326,842	315,737	296,085	—
Per cent. of these to the total No. of children	74.8	73.1	72.0	72.0	—

that are obtained. From the health point of view, this system is probably nearer the ideal than any other. It affords the best opportunity for really good lighting and ventilation. Negatively it has one great advantage in that, by eliminating corridors or at least reducing them to a minimum, it avoids the problem of the verandah, which besides being frequently a nuisance on account of draughts, is too often the principal eyesore in school architecture today.

Designing Schools

It is curious that so little attention is paid, in many school buildings, to æsthetic values *per se*. True enough, an enormous advance has been made on Edwardian insensitiveness. A feeling for materials and surfaces is beginning to show itself. It is at least something that good sand-faced bricks should be in demand today. But it is a rare thing to find the thicknesses and proportions, the spacing and recessing, of walls, windows and doorways designed with real understanding of their æsthetic effect. The significant interaction of masses and voids, the play on one another of effects of light-absorption and light-reflection and of large and small surfaces—the value, for example, of emphasizing the expanse of a wall structure by the plainness of its facing and contrasting with it the light tensile strength of metal—these basic æsthetic factors are still only half-heartedly used, or even neglected altogether.

There are other principles that affect school planning but cannot be elaborated here. We are at the beginning of the road in all these things. The grouping of our school activities has not yet had all the attention that it requires, but any such grouping has a vital effect on planning. It is possible that in the future we shall move towards a greater separation of certain parts of the school building from other parts. In a rural senior school, for example, the laboratory and the workshops may with advantage be grouped together in a block adjacent to the school garden. Such a school needs also its "quiet side," where ordinary classwork will be undisturbed by the noise either of hammers or of jumping boards. Of course, there is no ideal arrangement and there will, it is to be hoped, never be a perfect standard plan. Every school building is a compromise, and so it must be always—so long as there is vitality in our British educational system. For the same reason that we should give up the idea of symmetry as an end in itself, we should also recognize the impossibility of reaching perfection in school planning. The real perfection consists in constant change, constant improvement, constant adaptation. If we are capable of this, we shall not go far wrong.

A: PAST AND PRESENT

SCHOOL HEALTH

BY J. L. BURN

School Medical Officer and Medical Officer of Health, Hebburn-on-Tyne

THE time has now come when we must live up more truly to what we know to be right and wise for the health of our school children. We all accept the fact that in order to create a virile race, we need finer and healthier children. But to this proposition we must bring the assent, not only of the mind, but of the will. In the past there have been low standards, with small and cheap ideals. For example, we were concerned too much with negative aspects of health, the removal of gross hindrances to health, the ascertainment of defects, and an excessive concentration on the pathological and abnormal. It must be remembered that the school medical service grew out of the reaction of the country to revelations of physical defects such as those furnished by the recruiting sergeant in the Boer War, when it was found that two out of five candidates failed to pass a low standard of fitness. The school medical service is beginning to shake off some of the worst effects of its origin. A more positive ideal of health is abroad. We desire our children not merely to satisfy certain minimal requirements but to attain maximal development.

School health offers immense opportunity. In the child we can see, if our eyes are quick, the *beginnings* of disease, with an opportunity of remedy. We can attempt to preserve, before damage is done, the remarkable degree of health with which I see (in child welfare work even in a "depressed" area) 90 per cent. of babies endowed at birth. We can secure at an economical cost a healthy environment for our children during school time, which represents half of the conscious life of the child. As a medical officer of health I realize daily how economically difficult it will be to provide a healthy, adequate and beautiful house for all our working-class families ; but it is not so difficult to provide a healthy and beautiful school for our children during so important and impressionable a period in their lives.

Since the subject of school health is so big as to merit many volumes of discussion, I will be able to give here only some personal views.

In my view, a school medical service should be able to ensure :—

1. That every child receives inspection, investigation and treatment of psychological, mental or physical defects.

2. That all the physical conditions of school environment will benefit the health of the child.

3. Adequate methods of prevention and control of infectious disease.

4. Instruction to the child in the art of health.

5. Provision of forms of special education for physically and mentally defective children.

6. Provision of nourishment to needy children.

Conditions of School Health

(*a*) *Psychological.* — The psychological aspect is placed first advisedly. Hitherto we have taken too physical a view of disease. Let us remind ourselves of fundamentals—that health means *wholeness ;* that body, mind and personality are working in harmony and efficiency. Our official school medical inspection cards bear a list of physical defects for which the medical officer is to direct his search, but they do not mention, as they should, such psychological conditions as conduct ; how the child is getting on at school ; the existence of such conditions as neurosis, "solitariness," anxiety and overstrain. These are the great points on which happiness and usefulness depend, and are far more important to the true health of the child than many of the minor physical defects to which attention is given.

I believe that the worst indictment of the old and overcrowded school is not on physical, but on psychological, grounds. Such buildings cramp and hamper the outlook and activities of the child. Conversely, the well-planned school, with its space and "freeness," offers a sense of freedom and release which is of the utmost value. The advantage which a good building takes of sun and air is a psychological help, especially to those sensitive, nervy or difficult children, who, if their early environment is good, will grow up to be the salt of the earth. I know some of the schools in industrial areas which are so crowded that there is no room for storage or use of equipment of the "free expression" type of work which is so valuable for the child's mental health. Another fault of this type of school is the overpressure on the drill in the "Three R's." The school medical officer comes across conditions when examining apparently dull or backward children which can be traced to excessive educational drilling at the expense of creative and expressive work.

Only twenty-two local authorities at present provide facilities for child guidance clinic work. Little acquaintance is necessary with the methods and benefits of skilled treatment for children showing behaviour disturbances and early symptoms of nervous disorder, to realise their value. Yet few people are alive to the connection between the fears and unhappiness of childhood and the nervous disorders of later life.

(*b*) *Physical.*—In school medical work nowadays we do not see the gross anatomical defects that were seen in the infancy of the service thirty years ago. Much of the hardship, cruelty, disease and uncleanliness which surrounded childhood then has vanished. Gross cases of rickets, for instance, are rare, and in some fortunate areas, non-existent. Our task seems now not merely to catalogue and ascertain defects, for they are already well measured, but to secure a higher standard of health. We must concentrate now on the function of the child and less on the form. To this end, a few progressive areas are studying the questions of sleep, energy and vitality, diet and exercise, and the happiness of the child in relation to school and society, instead of being exclusively concerned with fiddling little physical defects.

" We adults do not realize how near the floor the younger child lives, and how easily the floor can be a source of infection." *A nursery school in Vienna.*

Nutrition

There is a widespread feeling that a great many more children are undernourished than are revealed by official statistics. These latter vary enormously in different areas and in adjacent areas, and for no apparent reason. We know little about malnutrition ; there is no quick easy impersonal test for it, and our methods of diagnosing it are painfully inadequate. To illustrate the chaos which exists in the diagnosis of this all-important condition, it is a fact that two adjacent areas with comparable industrial conditions and populations, have differences of twenty, and in one case forty, times the number of cases of malnutrition according to their respective medical officers. I have the uneasy conviction that malnutrition is widely underestimated. Perhaps we have succumbed to the peril of debased averages—after seeing so many children of a sub-normal type we get unconsciously to accept that type as an average. In my experience, the children in " distressed " areas do show in their tissues the marks of the depressed economic circumstances of their parents.

There is one certain test for malnutrition, but a somewhat difficult one to apply on a large scale, which might be used to the benefit of the children. The children could be closely examined and then given a rich and nutritious diet for, say, six months. The diet would be generous, and not of the nicely calculated more-or-lessness which characterises our efforts to find the minimum amount of food which suffices. The results, I submit, would be striking, and would prove by the happiest means that malnutrition had existed previously, although the children may have been passed as " normal."

At present, I must pass many children as of normal nutrition, for they appear to be so ; yet I know they are on a diet of the " tea, bread and chips " variety. I have been in hundreds of homes when dinners are being prepared, and I know that the diet must be inadequate for the needs of the growing child. Some of the children looked apparently well on it, but the fault must lie with our methods of examination and the little that is really known about the subject of nutrition. Nature cannot be cheated, and the children must not suffer from *our* lack of knowledge.

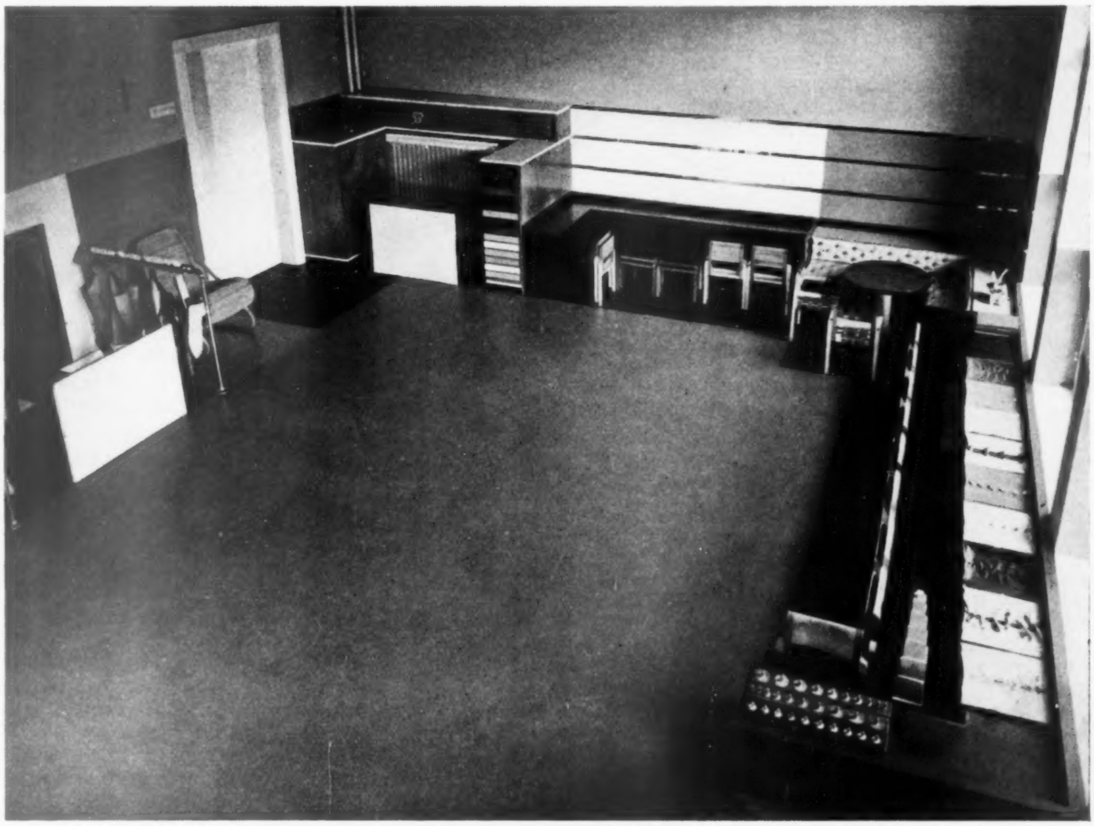
Fortunately nowadays a means of partial remedy exists in the " Milk in Schools " scheme of providing one-third of a pint of a first-class food for one halfpenny. In my own area there has been a ten-fold increase in the consumption of milk under this scheme. Again, in our school canteens, I have endeavoured to provide meals rich in those more expensive food elements, which are most lacking in poverty-stricken homes. It is a most unfortunate fact that the vitamin and first-class protein foods (meat, fish, milk products, raw salads) are expensive and yet so needed by the child ; whilst the common starchy foods, of which there is such excess in poor homes, are so cheaply and readily available.

Physical Education

As an important part of the child's education, it must be given an understanding of the conditions of health, and an appreciation of the art of living; a real will to follow the laws of health must be created. I have tried to do this by talks to teachers and children, emphasising that hygiene need not be as-dull-as-arithmetic, as I fear it might be described at present. I have used models of Greek athletes in the case of older boys in order to show, not merely physical perfection and being sound in wind and limb, but also joy, freedom and harmony in physical activity.

Environmental Education

The child must learn its lessons of health consciously in these ways, but what is more important, should learn unconsciously from the hygiene of its surroundings, from the sanity and sanitation of a well-planned school and equipment. " Ay, there's the rub ! " What, indeed, is the use of lecturing the child on hygiene if the school, with its poor facilities, out-of-date and unhygienic lavatories, inadequate washing



Flexibility of arrangement in all furniture and fittings, now recognized as one of the basic requirements in all nursery schools, is shown in practice in Franz Singer's nursery school in Vienna. In the upper photograph the tables are arranged for group activities; below, the floor is cleared for exercise.

accommodation, its ugliness and darkness, its lack of playing fields, its overcrowded classrooms, teaches the child unconsciously the very reverse of what we tell it?

My own local authority is anxious to possess an open-air school, but I have tried to stress the need of making every school an open-air school. I think it a waste of money and effort to have one special open-air school, when the average conditions for the other schools, containing thousands of children, are poor.

The Need of Space

The lessons of modern epidemiology are very definite in their requirement of plenty of space. Many classrooms are too high, but few are too big. In a small classroom the spread is facilitated (by droplet infection) of those inflammations of the whole of the respiratory tract from the nose to the lung, which, in their effects on the future health of the child, are more important than many of the common infectious diseases.

Three hundred years ago, Commenius urged that schools should consist of "airy rooms and pleasant places." Fresh air, with the oxygen and health-promoting factors which it contains, is the first requirement of life. I wish that education authorities would remember that wonders can be done with old classrooms if one can drop the windows to the floor, or knock down a wall on the sunny side and substitute a movable partition of wood and glass. In an old building, owing to the effect of "floor sag," a few feet of the wall may have to be left, and we must be content with a movable partition for the upper part of the wall. Of course, every old school should have a good outside shelter where children may have their lessons (or, in the case of toddlers, may sleep) in the open air on the slightest encouragement from the weather. In ill-ventilated classrooms there is danger of "waste" air, infected air, or what Margaret Macmillan termed "air sewage," remaining. The rooms must be regularly "air-swept," and so greatly do I believe in the disinfecting power of fresh air that we abandoned methods of spraying rooms with disinfectants and substituted methods of local cleanliness (such as the old-fashioned soap-and-water) with thorough through ventilation.

I wish more attention was paid to the flooring of existing schools. Some form of impermeable covering of the old wooden floors is urgently necessary. We adults do not realise how "near the floor" the younger child lives, and how easily the floor can be a source of infection.

Again, there is an urgent necessity for better cloakroom accommodation, with facilities for the drying or changing of clothes and footgear. Our slum schools (for only by that term can some of the dark and overcrowded buildings in our poorer areas be described) generally possess a crowded cloakroom which is a hindrance to school health. I am convinced that the wet and cold feet which some of our poorer children have to endure during school hours is a menace to their future health.

"The Need of Space." A corridor in a school at Prague, with adjoining cloak racks. The use of corridors as cloakrooms is generally condemned in this country, and where corridor cloakrooms mean a row of pegs in a passage, this condemnation is fully justified. Abroad, however, the corridor cloakroom is in general use, both winter and summer seasons being usually much drier than in Britain. The cloakrooms shown above are heated, the grilles can be locked, and the distance from classroom wall to outside cloak-space wall is about 22 ft.

We must aim for healthy conditions for the average child throughout school life. One would willingly sacrifice all formal physical training and all gymnastic exercises, if only the hour-by-hour conditions of our schools were better. It may be difficult to prove by statistics that present conditions exert a baneful influence on health. But medical officers of health know from experience of slum clearance work that the grossest sanitary defects may exist without apparent effect on the health of the inhabitants, and we must be prepared to go forward courageously, knowing, as we do, from first principles, that present school conditions must be exacting their penalty of ill-health, whether we get to know of it or not.

Great advances have been made since the introduction of the school medical service in 1907, but the future calls for intense effort, "mental fight," and expenditure of money if we are to reduce the vast and unnecessary unhealthiness of later life.

B: CONTEMPORARY WORK

ON the pages following there are illustrated eleven school building schemes, all of them selected as representing the architectural expression of a new attitude of mind towards child education. In addition, where the examples shown are foreign, the buildings have been chosen from amongst those most closely comparable to local education authorities' schools in this country.

THE SCHOOLS ILLUSTRATED

VILLEJUIF, FRANCE. By André Lurçat.

NURSERY SCHOOL, CHESTER. By Gibson and Lemmon.

FRENCH SCHOOLS, PRAGUE. By Jan Gillar.

EXPERIMENTAL SCHOOL, U.S.A. By Richard J. Neutra.

FEN DITTON, CAMBRIDGE. By S. E. Urwin.

SURESNES, FRANCE. By Beaudoin and Lods.

PRIESTMEAD, HARROW. By W. T. Curtis; H. W. Burchett, Assistant.

GIRLS' SCHOOL, VIENNA. By Theiss and Jaksch.

ANSONIA HIGH SCHOOL, U.S.A. By William Lescaze.

JULES FERRY, FRANCE. By Dubreuil and Hummel.

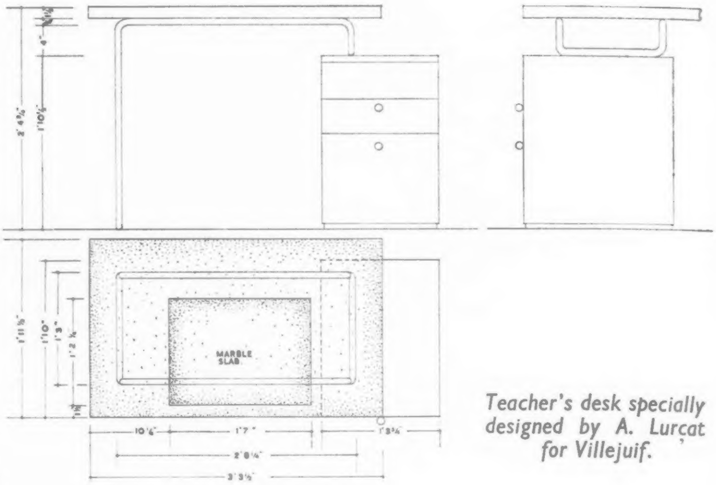
BLOWERS GREEN, DUDLEY. By Butler, Jackson and Edmonds.

VILLEJUIF, FRANCE

•

By ANDRÉ LURÇAT

The School at Villejuif was completed in July, 1933, when it was opened by the Mayor of the Communist municipality, Paul Vaillant Couturier. Before it was completed it had already attracted widespread interest and its influence on subsequent French municipal school design is very marked. The following notes are contributed by Mr. William Tatton Brown, who was formerly an assistant to André Lurçat, and are intended to explain the reasons for the great influence of Villejuif. The notes include mention of some of the defects which have now become apparent in the school.



Teacher's desk specially designed by A. Lurçat for Villejuif.

PROBLEM—Day school for 800 boys, girls and infants; gymnasium; changing rooms; stadium; and sports grounds. Cost: £100,000.

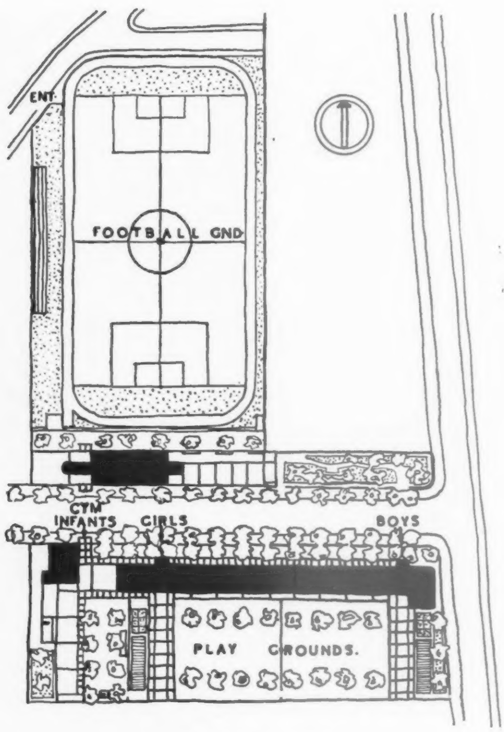
LURÇAT'S METHOD—(1) Disregard of all existing schools. He did not spend a single instant visiting the schools which had already been built, nor did he do any research into the solutions provided by other architects.

(2) Instead, his preparatory work was devoted to the study of the problem, to consulting educationists, psychologists, teachers and doctors. In this way he became acquainted with child mentality, way of life and peculiar requirements. He was thus able to draw up a table of "needs," and give to each one its appropriate solution.

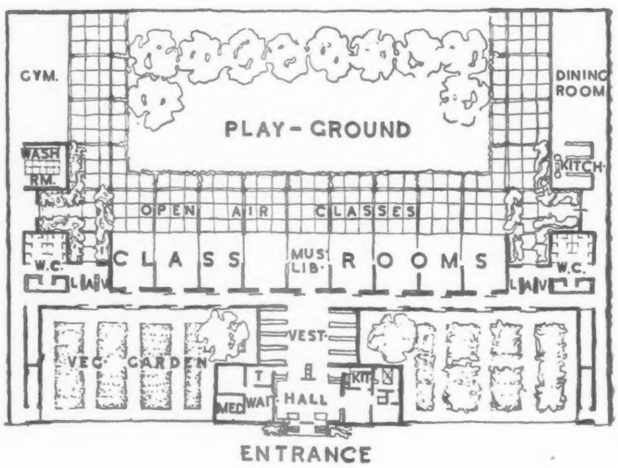
(3) Each "need" is given its fulfilment. He designs first of all a special table and chair for the children, then for the staff. Progressing from these to the other furniture, he designs the ideal classroom and the final synthesis is the completed school.

(4) His method is thus the exact reversal of the old approach which consisted in drawing a "beautiful" façade, behind which master and pupils camped out as best they might, with the aid of an astute firm of scholastic furnishers.

IDEAL SOLUTION—By these methods Lurçat arrived at his ideal solution (plan below). The plan provides for:
Flexibility in the curriculum. Each classroom has a sliding partition which can either be drawn across the terrace (when the class is being held out of doors) or slid back into the wall, throwing one room into another. The architecture, like the teacher, is intended to give direction to activities in which the child does all the work.
Break-down of the barriers between manual and intellectual work by a large flower and vegetable garden in the front in which the children do all the work, and can be seen by their parents.
Provision of an aviary and aquarium in which the children can study other forms of animal life.



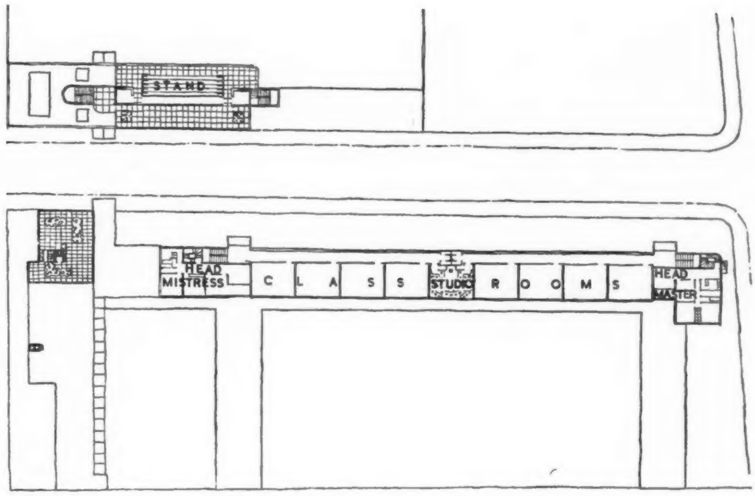
The Site Plan



The architect's preliminary ideal solution

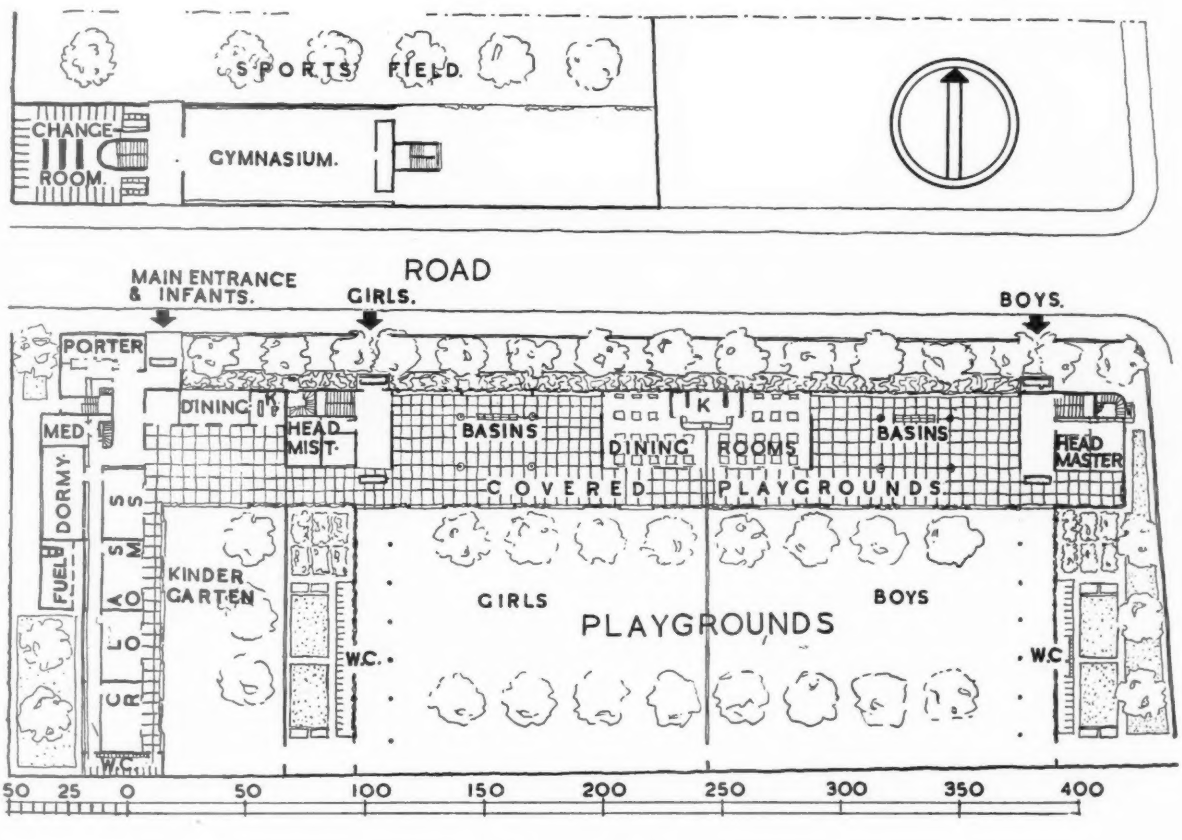
LIMITATIONS—The limitations imposed upon Lurçat's ideal solution by the French State school building regulations were: separation of the sexes; rigid division into isolated classrooms for 40 children each; provision of living accommodation for head master and head mistress, but at opposite ends of the building.

PLANS—The final plan (of which the ground and second floors appear on this page) is the result of a compromise between the ideal and the State regulations. The classrooms face south, access on the north. The kindergarten classrooms face east, and thus protect the playground from the prevailing wind. Services common to the boys' and girls' schools are in the middle—kitchens, dining room, doctor's room and studio. A workshop for the boys and cooking and dressmaking rooms for the girls are at the two ends. The roof of the gymnasium forms a stadium for the sports ground.

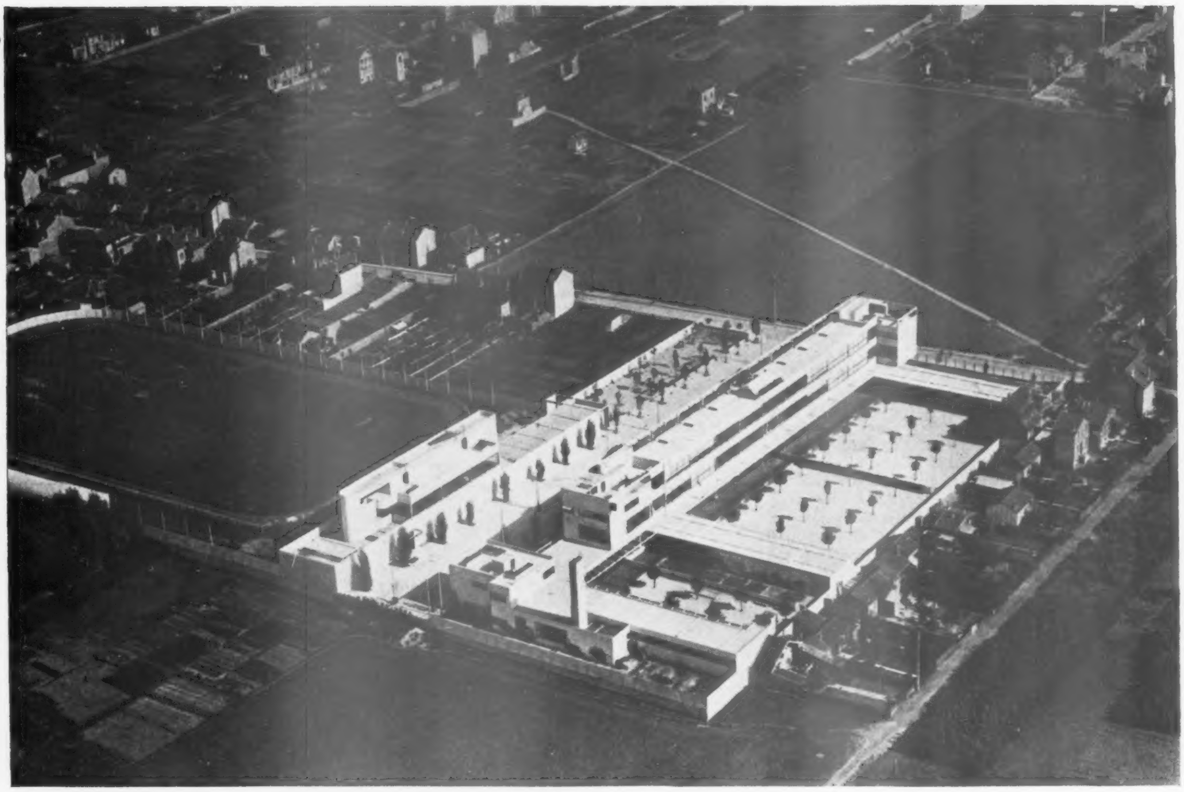


The Second Floor Plan

VILLEJUIF, FRANCE



The Ground Floor Plan



VILLEJUIF, FRANCE

COMPOSITION—The composition is based on a mathematical system of proportions.

The building is divided into bays of 8.75 m., which is double the floor to floor height of the classrooms. Each bay is thus a double square both in elevation from the exterior (vertically) and from the interior between one floor and another (horizontally).

Each classroom and its corridor, which forms at the same time a cloak room, is a square, while the classroom itself is in the proportion 3 : 5.

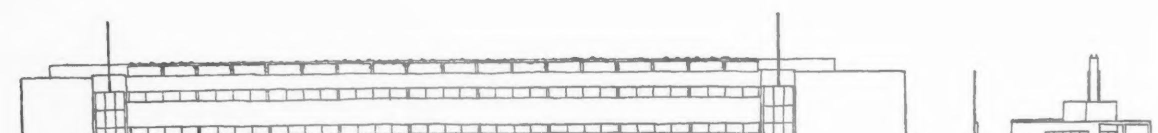
Each pane of windows is 3 : 5, while the complete elevation is 3 : 10.

Simple relationships of this kind determine the proportions of every element in the composition.

MATERIALS AND DEFECTS—In general the workmanship and materials are very good. R.C. Skeleton with hollow brick infilling is the main system of construction.

The exterior, however, is rendered, and very badly discoloured. The expansion joints have been omitted on the north elevation with consequent cracking of the rendering. Inadequate cross ventilation and protection from sun's rays is given to the classrooms, which consequently can become too hot in summer. Tile finish throughout means easy up-keep but bad acoustics.

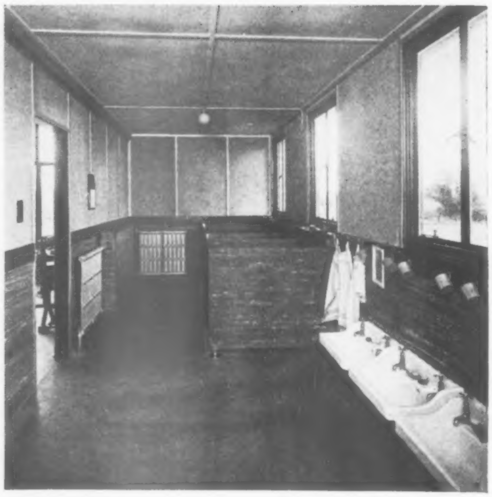
Above is an aerial view of the school group from the south-west.



The North Elevation

VILLEJUIF, FRANCE

The photographs show : top, a general view of the south court accentuating the transparency of the building. Above, left, the teacher's desk and furniture from which Lurçat worked "outwards" to the completed school. Right, the covered playground and girls' w.c.s adjoining the south court.



NURSERY SCHOOL, CHESTER

•

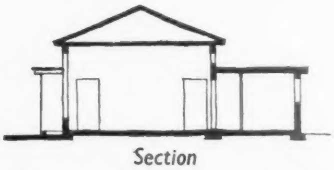
By GIBSON AND LEMMON

PROBLEM—A nursery school for two groups of twenty children each.

PLAN—The plan requirements fell naturally into two divisions: the playrooms, and supporting accommodation and equipment.

The central component of the plan was the play space, which can be thrown into one large area for ease of supervision while the children sleep in the middle of the day, and also during meal times. The orientation of the play space was decided by the need for sunshine during the morning. The flower beds before the windows are to prevent any danger arising from the edges of the outward-opening windows.

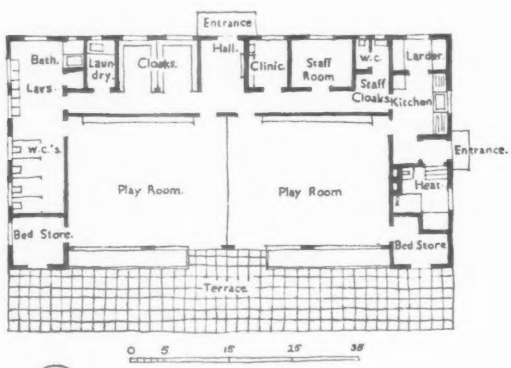
CONSTRUCTION—The building is timber-framed on a concrete raft. Wall studs are covered with asbestos cement sheets inside and out, with asbestos cement cover fillets outside. Asbestos-reinforced aluminium foil insulation is draped between studs. The pitched roof is of black asbestos cement tiles, with aluminium foil insulation.



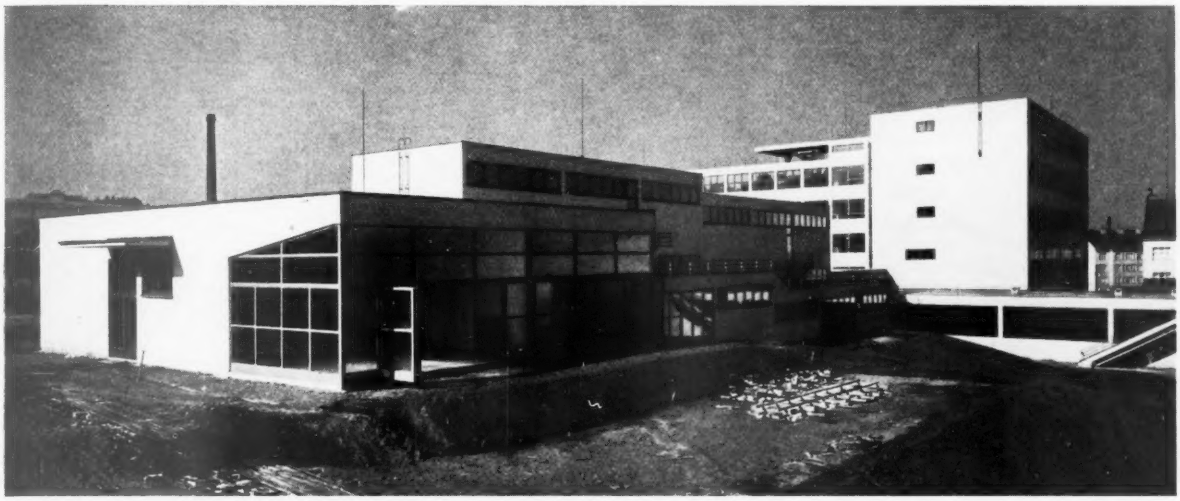
Section

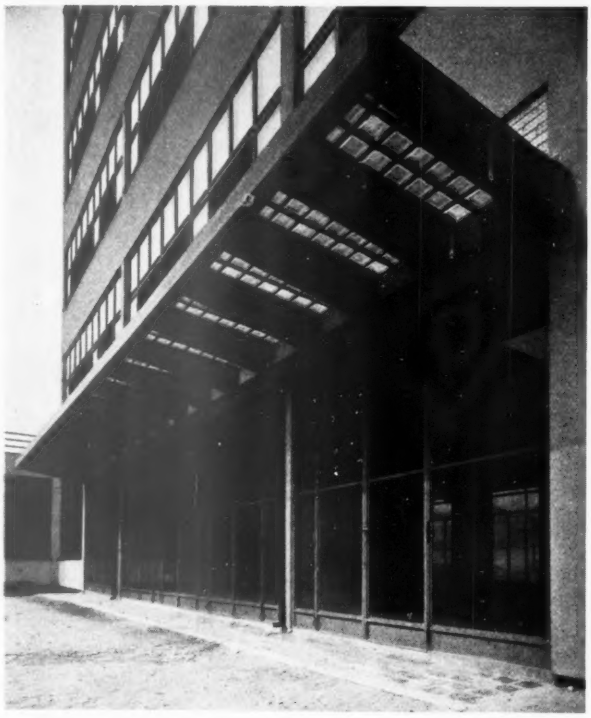
FINISHES—Externally, blue painted steel windows and blue painted flush doors; natural colour silver-grey asbestos cement walls, fascia and guttering. Roof black. Chimneys are of common brick painted to match walls. The terrace is of orange-coloured cement. Internally, the natural colour of the asbestos cement has been left; cover-fillets on ceiling are painted white, and on upper part of walls aluminium. Dados are of patent decorative asbestos cement sheets, floors of magnesite composition in green, grey and brown; w.c. partitions are of double-faced slab similar to dados, and doors and cupboards are of painted plywood.

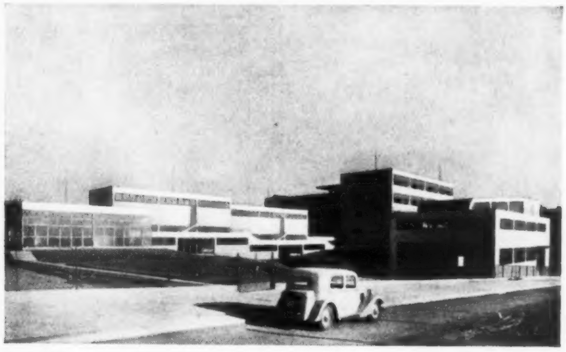
Top left, the south-east front; right, the lavatories. Above, the two play spaces thrown into one.



The Ground Floor Plan







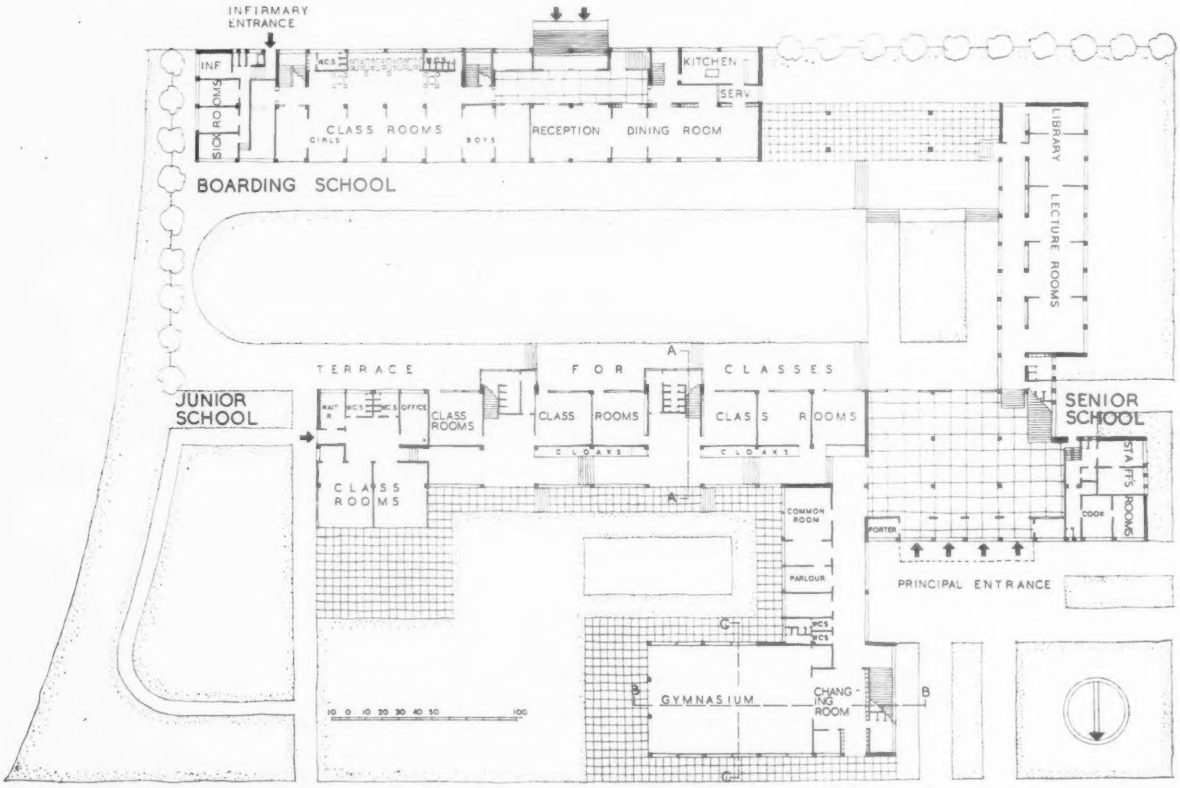
FRENCH SCHOOLS, PRAGUE

BY JAN GILLAR

PROBLEM—A complete school group for the French colony. The group comprises a senior or high school, a junior school and infants' department, and a separate boarding school wing.

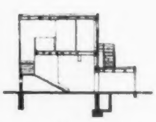
PLAN—The plan is of interest in its arrangement of separate units on a not too generous site. A large principal entrance hall is in the senior school block, with the special subject, staff and classrooms of this school on one side of and above it. The junior and infants' rooms face south and east onto grass courts, while the gymnasium and cinema block are planned for use both by the senior and junior schools. The main disadvantage of the scheme would seem to lie in the dormitories of the boarding-house facing north in order to overlook the central court. Windows are generally of the sliding type in order to allow classes to be held in the open air.

The photographs show : the central court with the infants' classrooms in the foreground ; centre, the main entrance and a general view from the north ; left, the return angle between the entrance hall, with senior classrooms over, and the senior school lecture-room block, showing the continuous window to the senior school staircase.

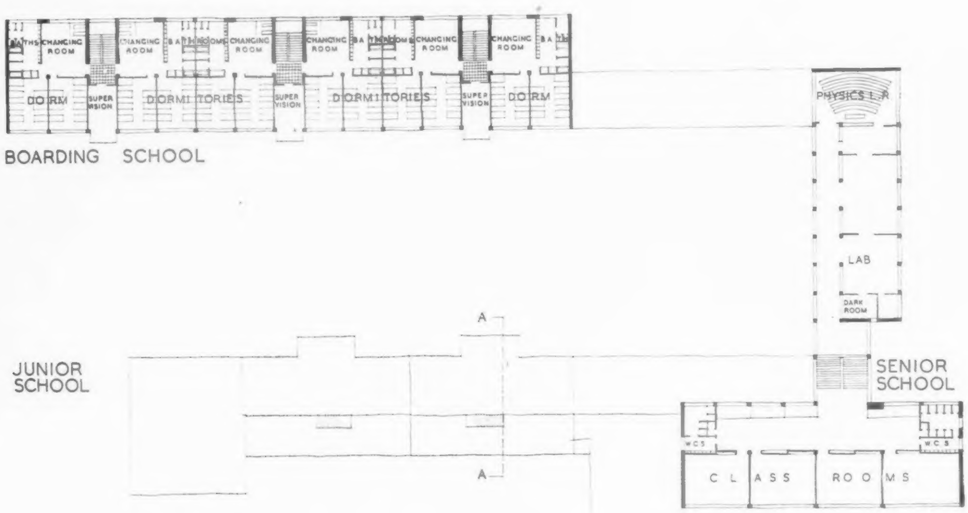


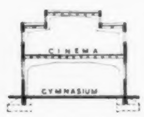
FRENCH SCHOOLS, PRAGUE

The Ground Floor Plan

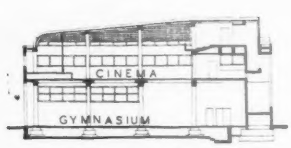


Section A-A

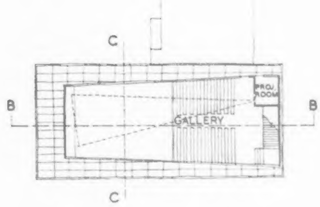




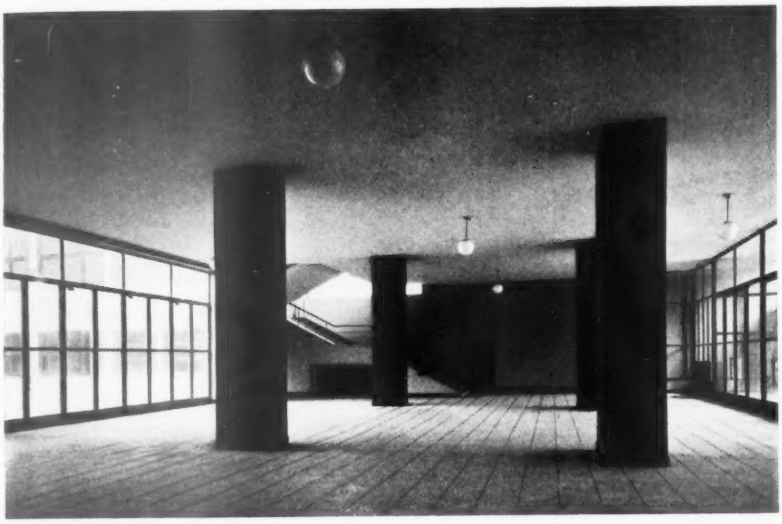
Section C-C



Section B-B

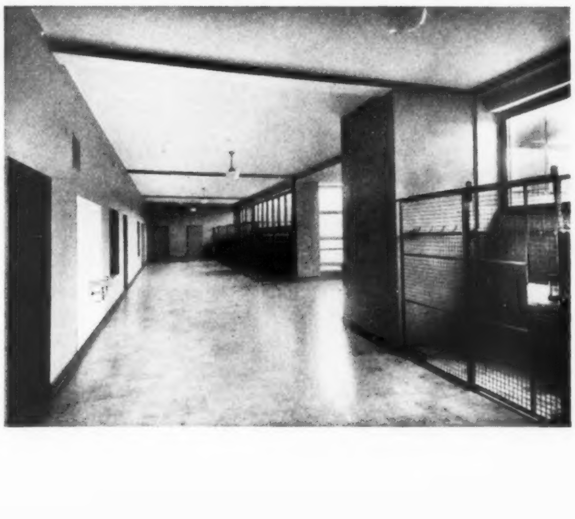


The First Floor Plan

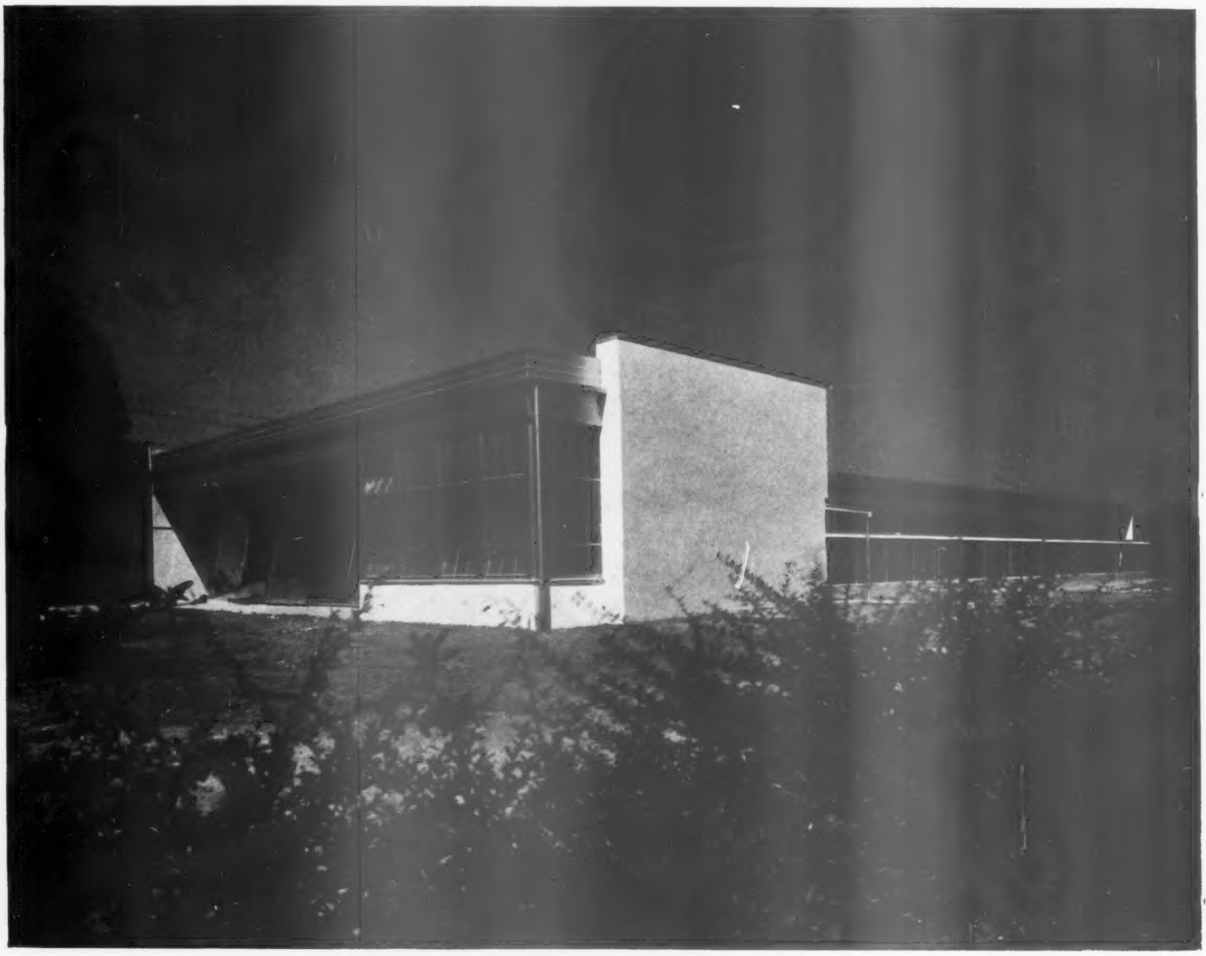


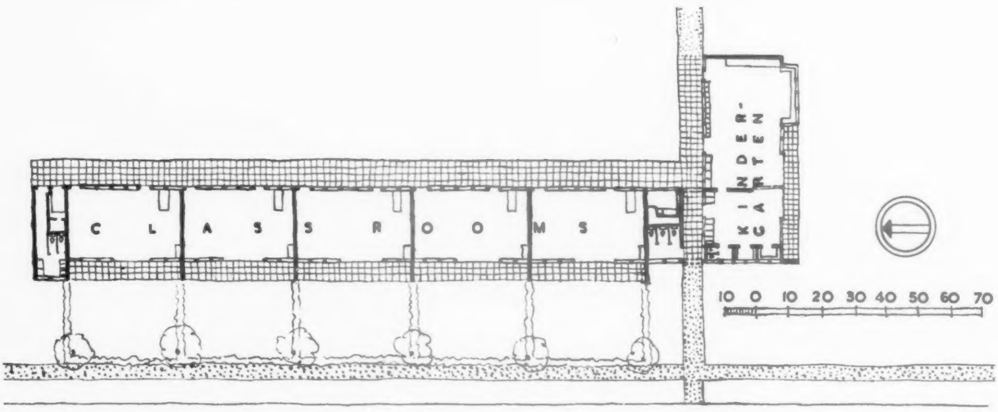
MATERIALS — Reinforced concrete construction throughout. The panel walls are insulated internally with 1½ ins. of asphalte and cork composition, and columns are cased with a ¾-in. thickness of the same material. Windows are of steel, floor finishes of wood block and asphalt composition, and furniture and fittings generally of steel and sheet metal.

The photographs show: left, the main entrance hall; left (below), a typical senior classroom; below, the cinemaand a corridor cloakroom.



FRENCH SCHOOLS, PRAGUE





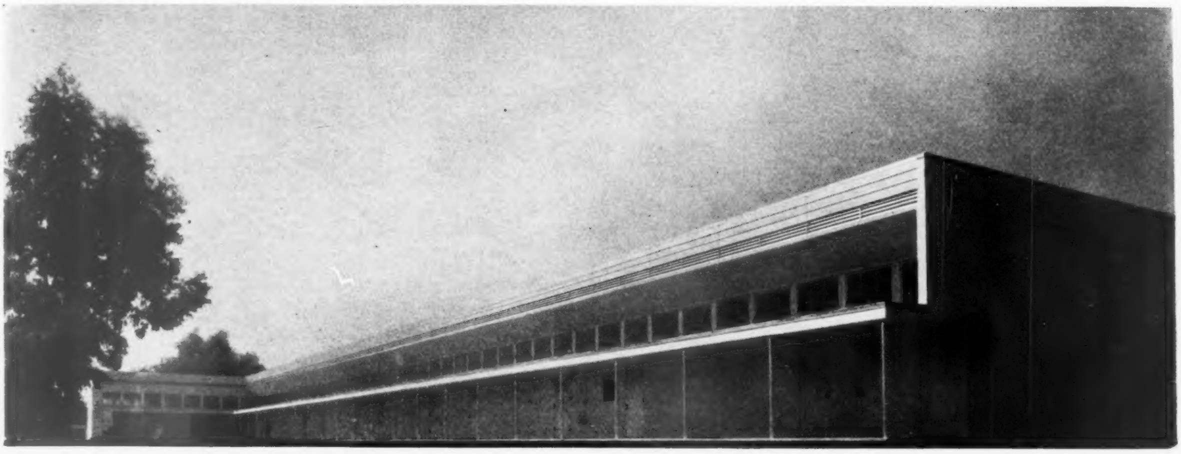
EXPERIMENTAL SCHOOL, U.S.A.

•

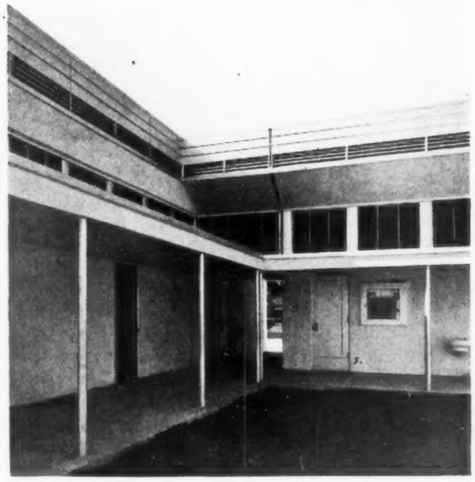
By RICHARD J. NEUTRA

PROBLEM—An experimental open-air day school for the Los Angeles School Board.

The photograph shows the school from the east.

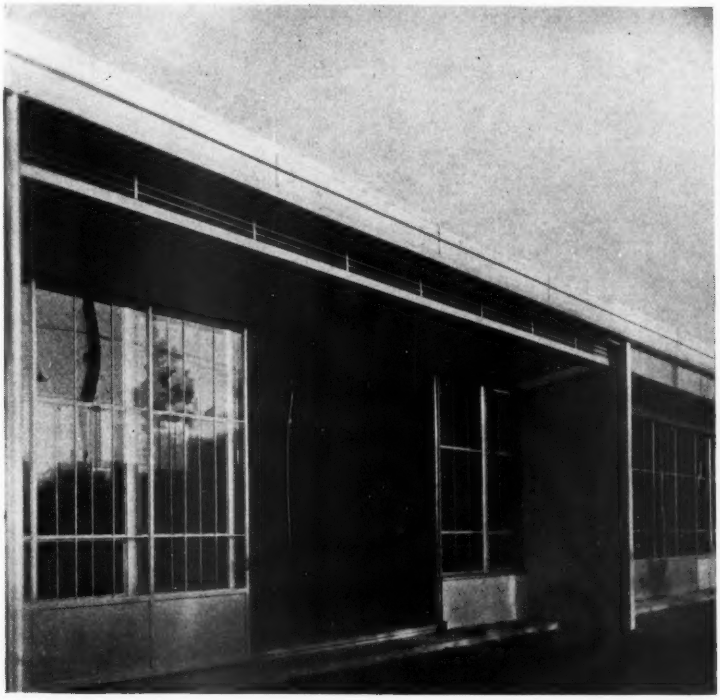


EXPERIMENTAL SCHOOL, U.S.A.



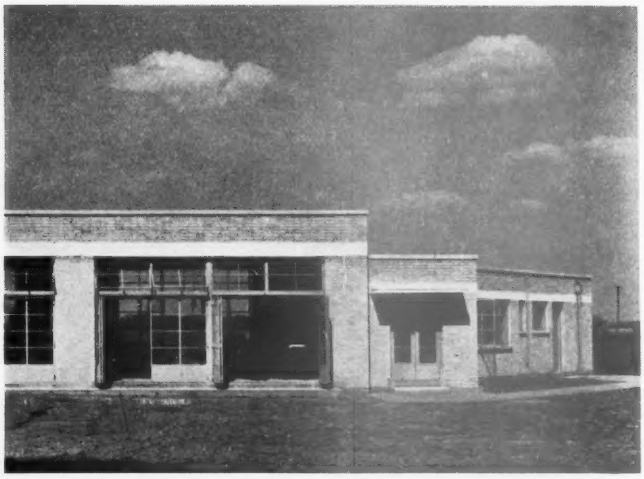
PLAN AND CONSTRUCTION—The plan is extremely simple and was evolved from the attempt to fulfil three principal conditions : to secure a lighting which would allow of every foot of classroom area to be used for educational purposes, whilst avoiding all glare in the classrooms; to achieve continuous good ventilation and complete insulation from heat with a very light construction ; to connect each indoor classroom as intimately as possible with its adjoining outdoor space.

Each classroom has a sink and table for practical work and cupboards for materials. On both sides of the classrooms the roof overhangs for about six feet. This roof is double, and between the classroom ceiling and the roof proper there is a continuous flow of air through the louvres visible in the elevational photographs. In the eaves of the upper roof is a mechanically-operated heat-reflecting awning, which rolls down to give protection from sun glare. The garden fronts of the classrooms can be thrown open by moving sideways single 16 by 12 feet glass partitions.



MATERIALS—Standardized timber framing, steel-braced and stiffened, sheathed with insulated copper and aluminium finished. Plinth and wall of kindergarten of white cement rendering on steel lathing. Foundations are light R.C. raft. All joinery is flush and finished in a bright blue green.

Top, the east elevation ; centre, the angle of the access verandah ; right, one of the classrooms with sliding partition open.



FEN DITTON, CAMBRIDGE

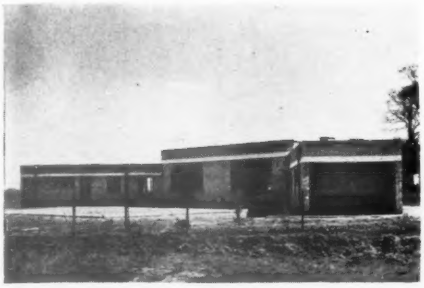
•

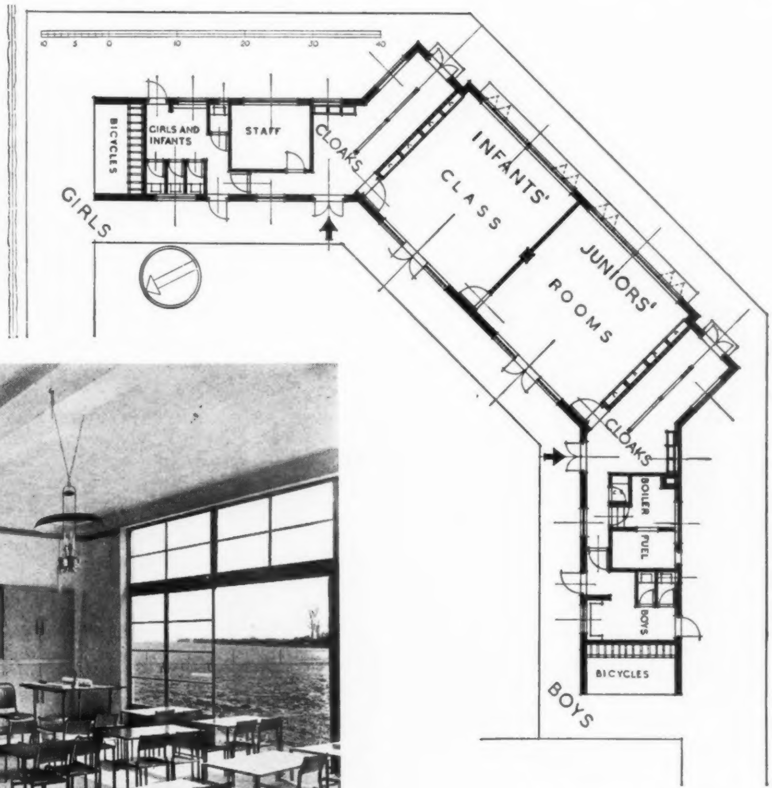
By S. E. URWIN

PROBLEM—A school for 80 junior boys and girls to replace an old blacklisted church school.

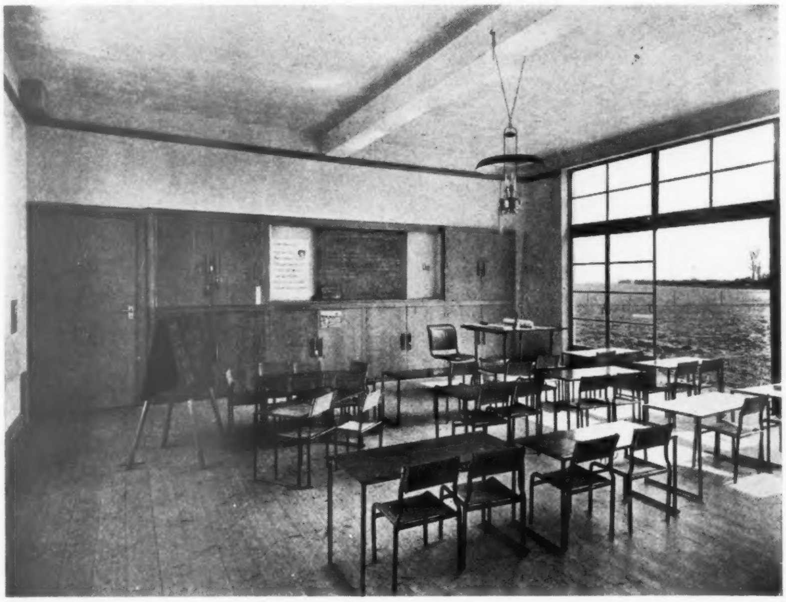
PLAN—The building is planned so that the classrooms face south-east, the most favourable aspect. Full cross ventilation is obtainable, and the south-east windows, of the sliding and folding type, can be thrown entirely open.

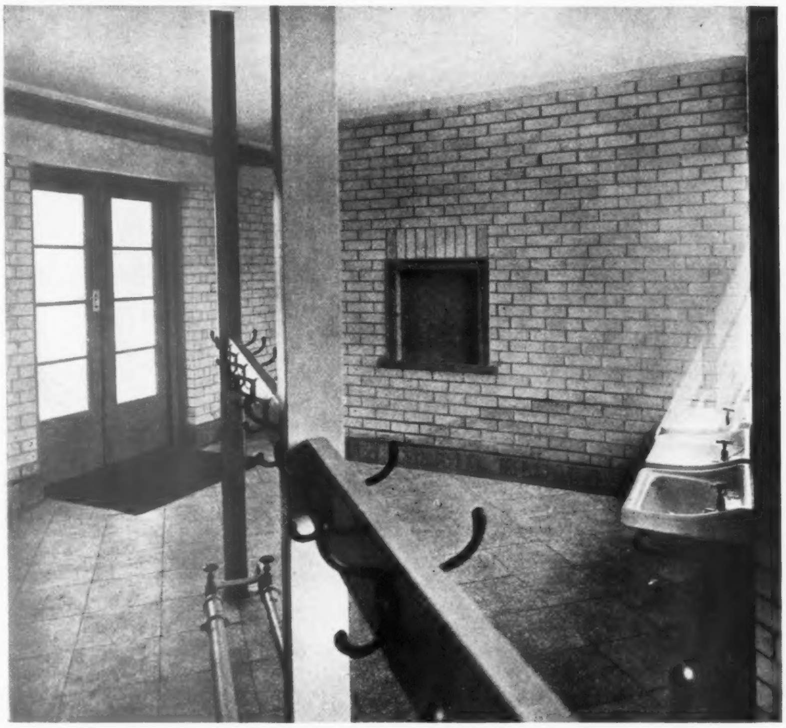
Above, a detail of the folding windows to the classrooms. Below, part of the south-east elevation.





The Ground Floor Plan



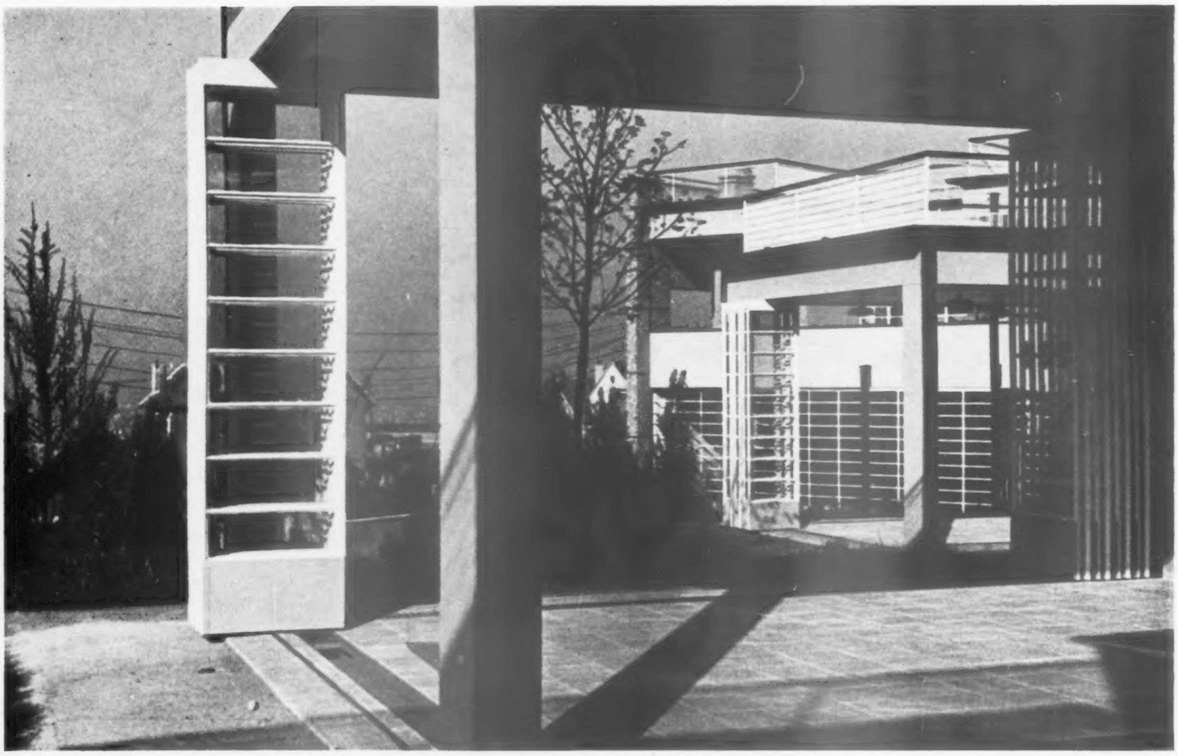


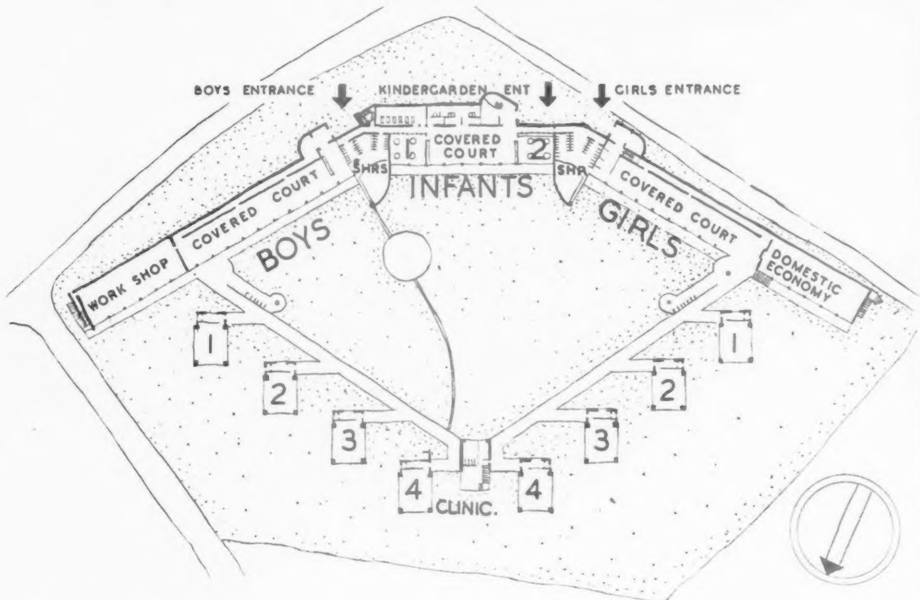
FEN DITTON, CAMBRIDGE

MATERIALS — Local cream hand-made bricks with 11-in. cavity walls and R.C. lintols. Roof is of timber, felted and asphalted. Floors are of waxed strip on concrete. Cloakroom floors are of 12-in. coloured concrete tiles. Windows are of steel, painted duck's egg green, and external doors are a warm buff colour outlined in vermilion.

Infants' room walls are pale primrose with pale blue ceiling, and powder blue joinery and vermilion windows. Junior room walls and ceiling are pale green and joinery duck's egg green. Built-in cupboards are of oak-ply, flat varnished. Staff room walls are cream with buff joinery and vermilion windows. The painted steel tables and chairs are grey with interchangeable grey canvas seats.

Top, a general view from the west ; centre, the infants' room ; below, the girls' cloak-room, showing hatch in staff room wall to give length to staff room for eye tests.





The Ground Floor Plan

SURESNES, FRANCE

•

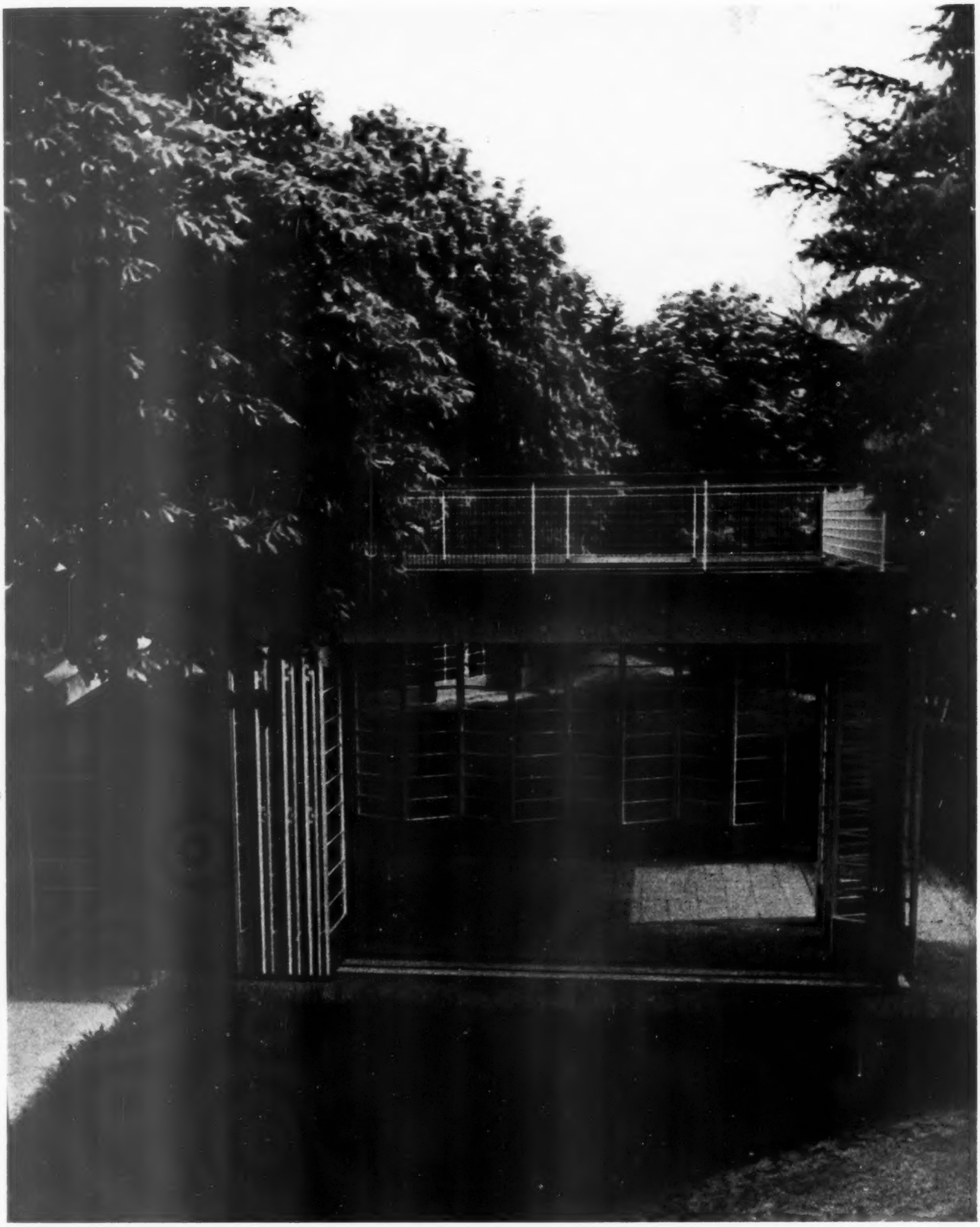
By BEAUDOIN AND LODS

PROBLEM—The school was designed for specially delicate children, but the requirements, and curriculum, were otherwise those normal in a French primary school.

PLAN—Of the fully open-air type. Each classroom can be thrown open on three sides, and is placed so as not to overlook any other. The flat roofs are used for resting and physical training and are linked with the main building by walks over the covered access ways. The large covered courts are used for exercise in bad weather. Each section of the school has its own dining room, showers and court.

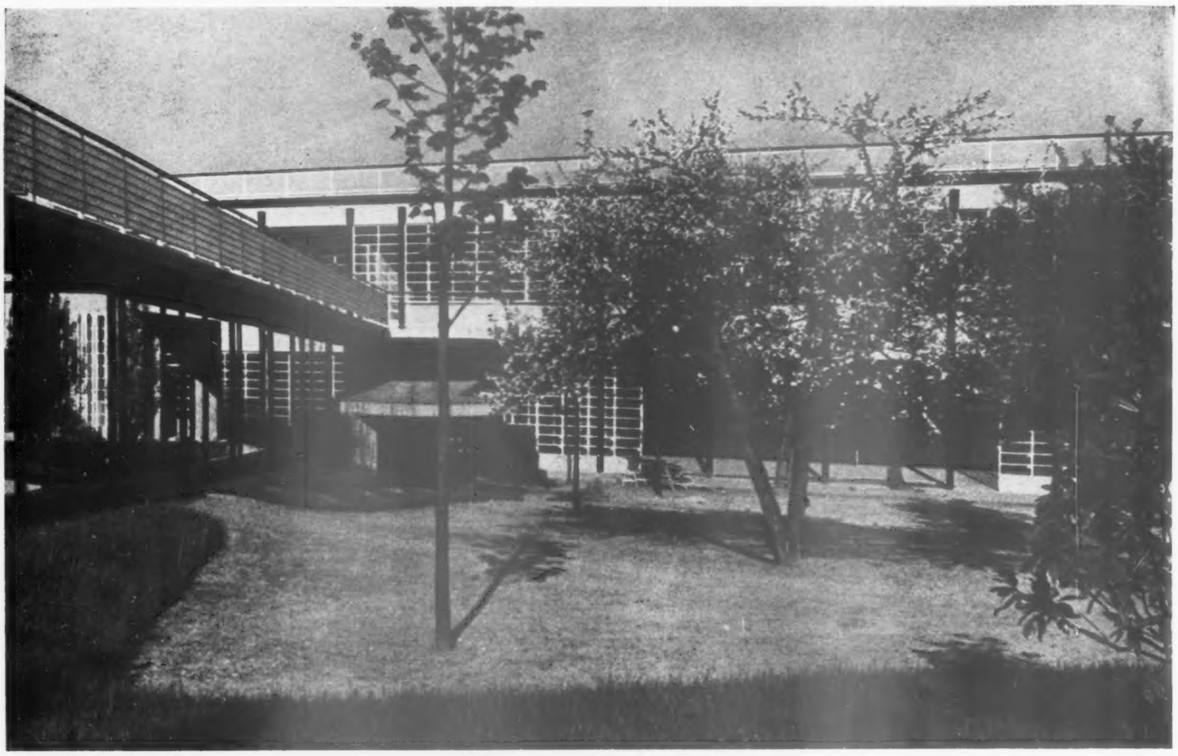
MATERIALS—Light steel framing and reinforced concrete. Walls are precast grey gravel-surfaced slabbing. Floors are of tiles. Sliding windows are of wood and steel. Columns and handrails are of steel. Paintwork generally is of light blue.

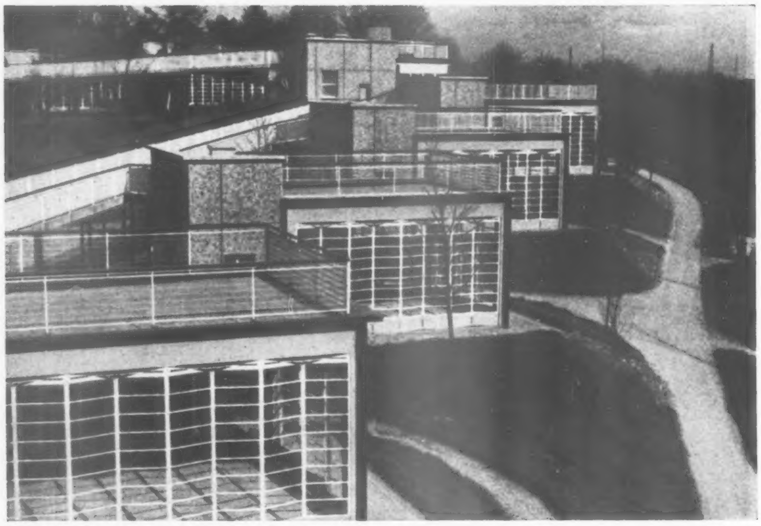
Above is a photograph of the workshop block taken through Classrooms 1 and 2.



SURESNES, FRANCE

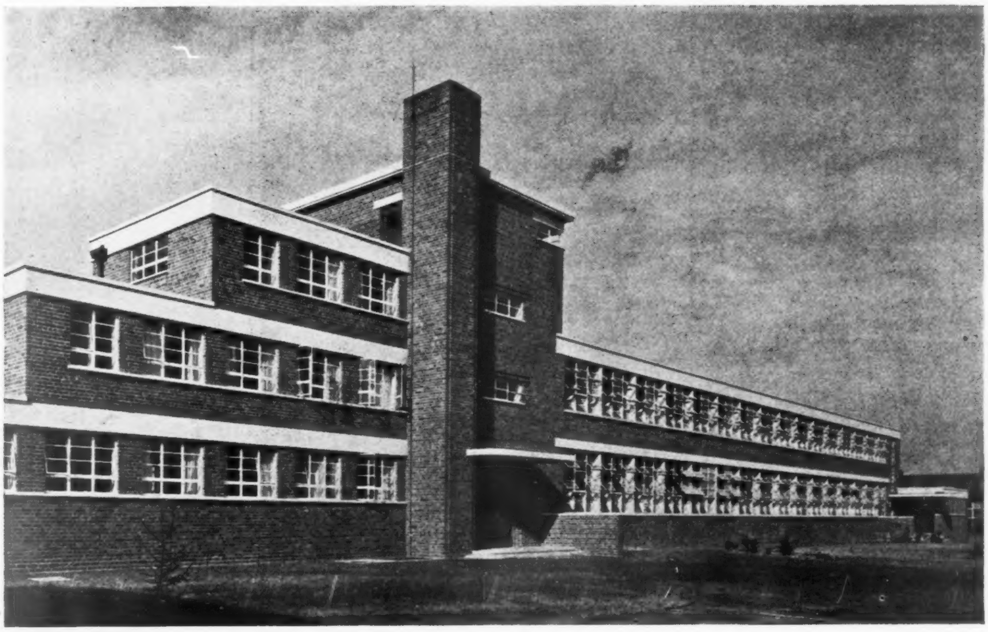
A detail of one of the detached open-air classrooms.

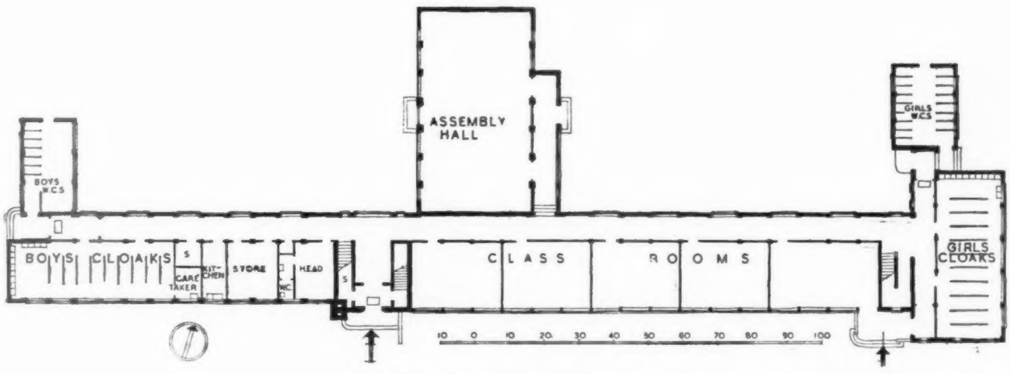




SURESNES, FRANCE

The photographs show: Top, the junction of classroom access corridor with the main block, with w.c.'s under the concrete hood shown; above, one of the ranks of classrooms; left, the tank in the central court.





The Ground Floor Plan

PRIESTMEAD, HARROW

•

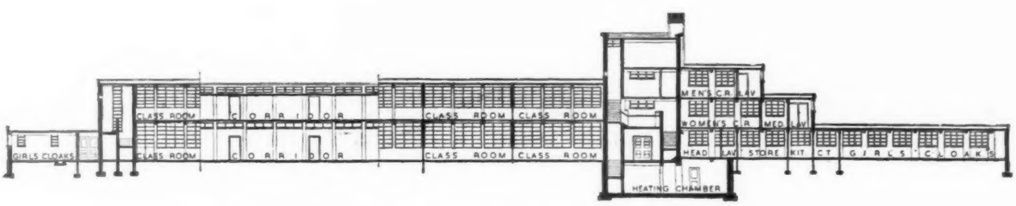
BY W. T. CURTIS; H. W. BURCHETT, ASSISTANT

PROBLEM—A school for 582 junior boys and girls. Accommodation for infants already existing on site.

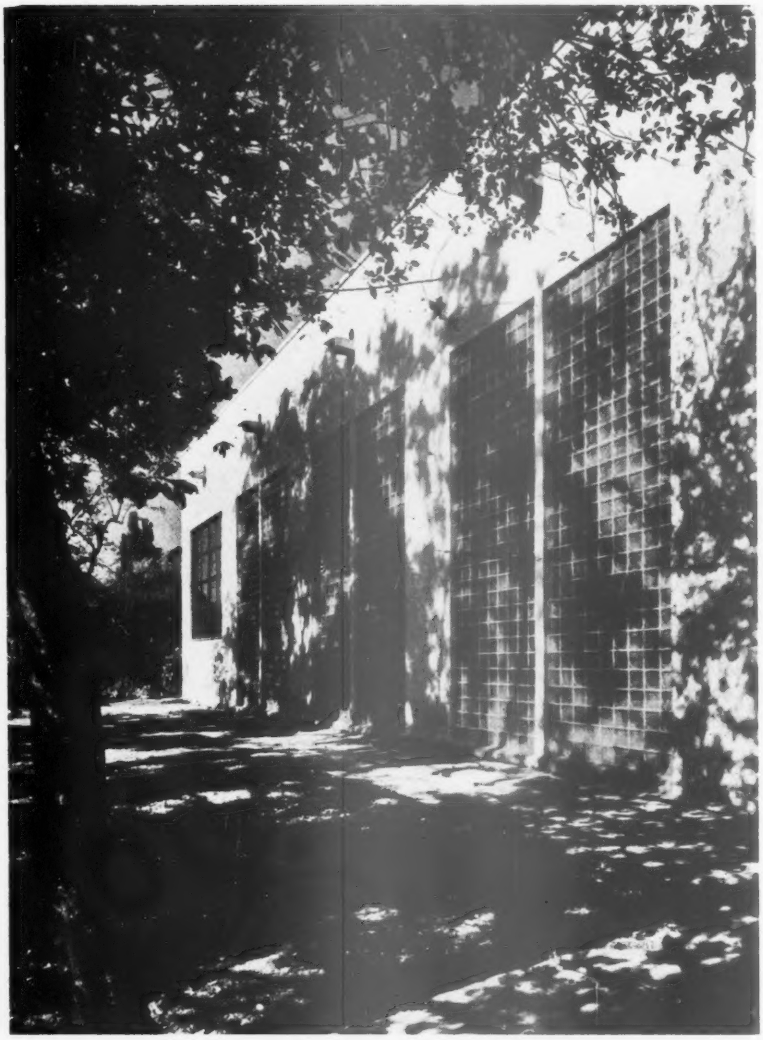
PLAN—Planned for the greatest amount of sunshine in the classrooms. Head teachers and staff rooms grouped round main entrance and tank room tower.

CONSTRUCTION AND MATERIALS—Cavity walls, brick piers and R.C. columns. R.S. channels in front of the columns carry the window lintols. Floors, beams and roof of reinforced concrete. Roof finish asphalt with 2 ins. ballast. Copings, cills and external pavings of artificial stone.

Rooms generally have fair-faced brick walls, distempered. Floors of red asphalt with granolithic finish in lavatories. Joinery flush and stained. Windows metal throughout, pivot hung in classrooms with separate roller blinds to each sash.



Longitudinal Composite Section



GIRLS' SECONDARY SCHOOL, VIENNA

•

By THEISS AND JAKSCH

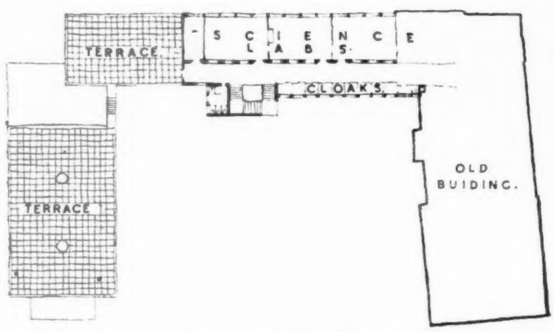
PROBLEM—A considerable amount of new accommodation was required on a confined site adjoining the old building, and the architects had to reconcile four important factors in their solution : as much light and air as possible was desired in the large amount of accommodation ; garden space was needed for the babies and outdoor classes generally ; protection against the extreme heat and cold of the climate was essential ; direct communication was needed from the new to the old school floors.

PLAN—The plan form attempts to reconcile these factors. The main classrooms face east with large windows, double for winter protection and fully opening for summer use. The cloakroom-corridors (see page 806) are sufficiently wide to allow for very easy circulation. The roofs of the gymnasium and part of the classroom block are available for physical exercises and classes, and the gymnasium block is low enough to give a blow-through to the central court.

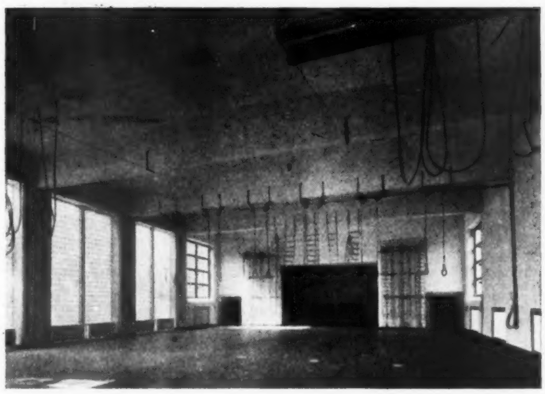
The principal windows to the gymnasium and the staircase window are of glass-concrete construction which give excellent lighting while being warmer in winter than any opening windows could be made. Ventilation to the gymnasium is partly natural and partly mechanical.

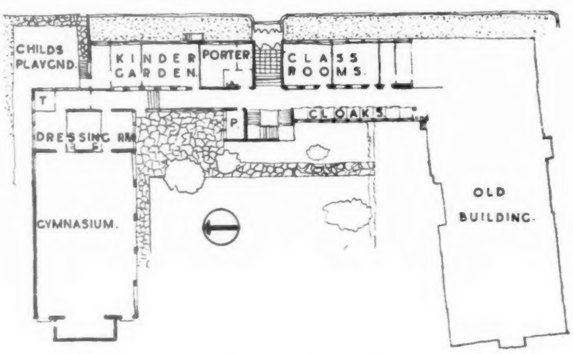
CONSTRUCTION—Of reinforced concrete rendered. Floors generally are of asphalte with wood composition blocks in the corridors.

Above, the glass-concrete windows of the gymnasium. Left, a general view of the internal court.



The First Floor Plan

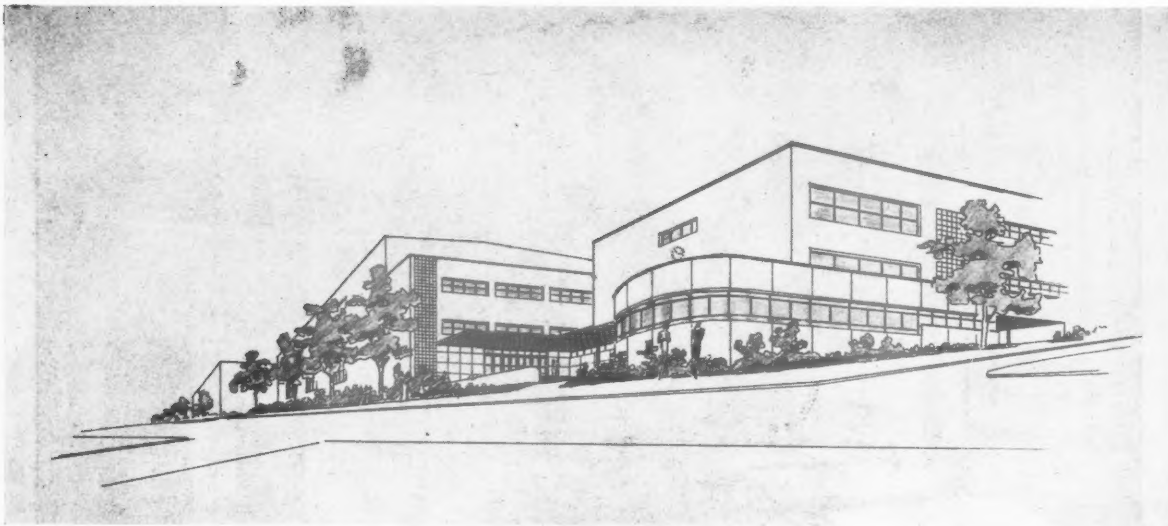


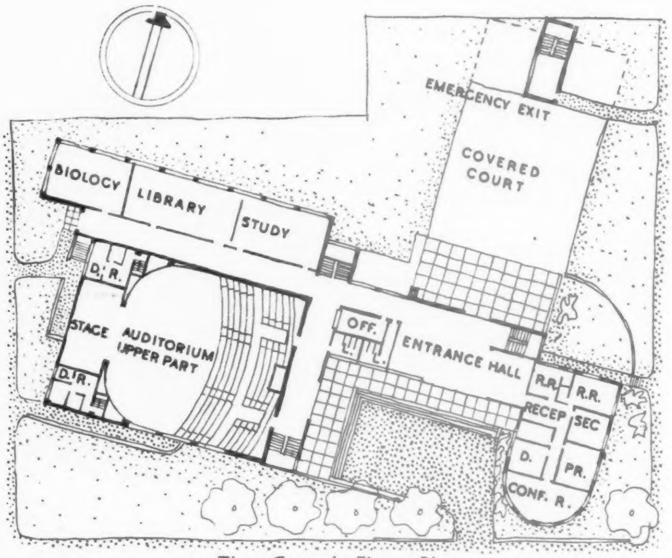


The Ground Floor Plan

GIRLS' SCHOOL, VIENNA

The photographs show: top, one of the general classrooms; and the gymnasium.





The Ground Floor Plan

ANSONIA HIGH SCHOOL, U.S.A.

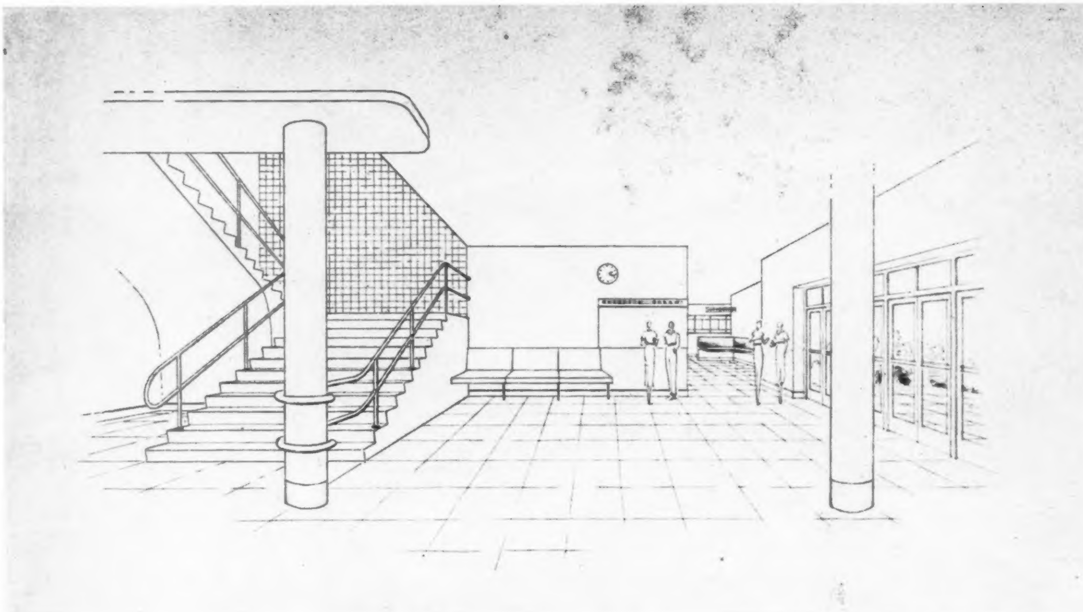
•

By WILLIAM LESCAZE

PROBLEM—The principal problem before the architect was that common to American high school planning—of placing upon a comparatively small site a very large amount of accommodation, whilst at the same time fulfilling the modern requirements of good aspect and a free, open-air grouping of units.

PLAN AND ACCOMMODATION—The main entrance hall on the south is placed between the auditorium and gymnasium block and the administration unit. To the north, with east and west light, is the classroom block, whilst to the west is the special study block.

The accommodation is provided as follows: Administration: Conference room; principal's office; senior women teachers; secretary; records; reception; two staff rooms. Auditorium and gymnasium: Auditorium seats 1,066 persons.



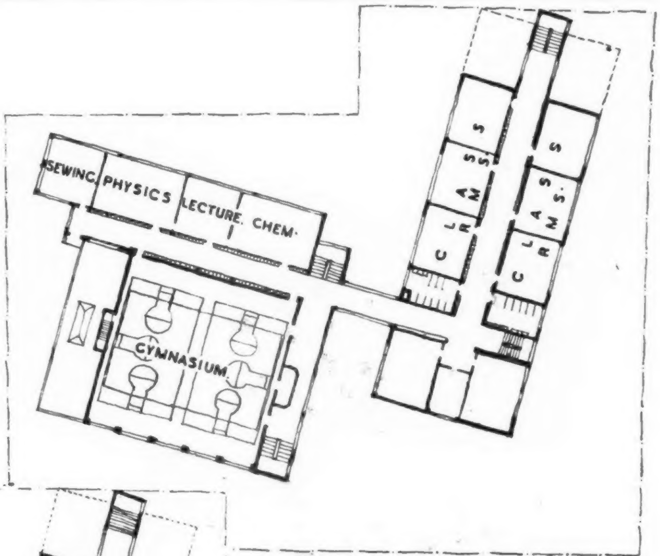
ANSONIA HIGH SCHOOL, U.S.A.

Accommodation (*cont.*)

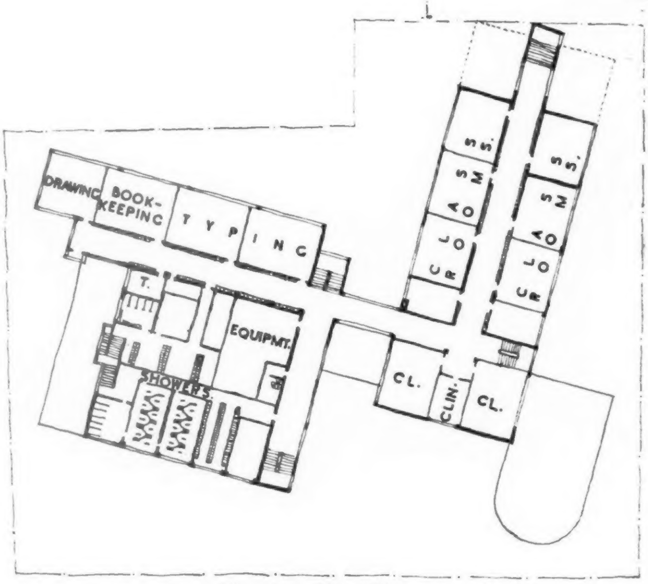
Classroom block (2 floors) : 16 classrooms, each accommodating 30 pupils, total 480.

Special Rooms : Ground floor : Lecture and Study, 60 ; biology, 25 ; library, 60. First floor : 2 typing, 80 ; book-keeping, 35 ; drawing, 25. Second floor : Chemistry, 25 ; physics, 25 ; lecture room ; sewing, 25.

The maximum accommodation of the school is therefore 840 students, but since the special rooms will not be all employed simultaneously with the classrooms, the working capacity of the school is about 600 students.

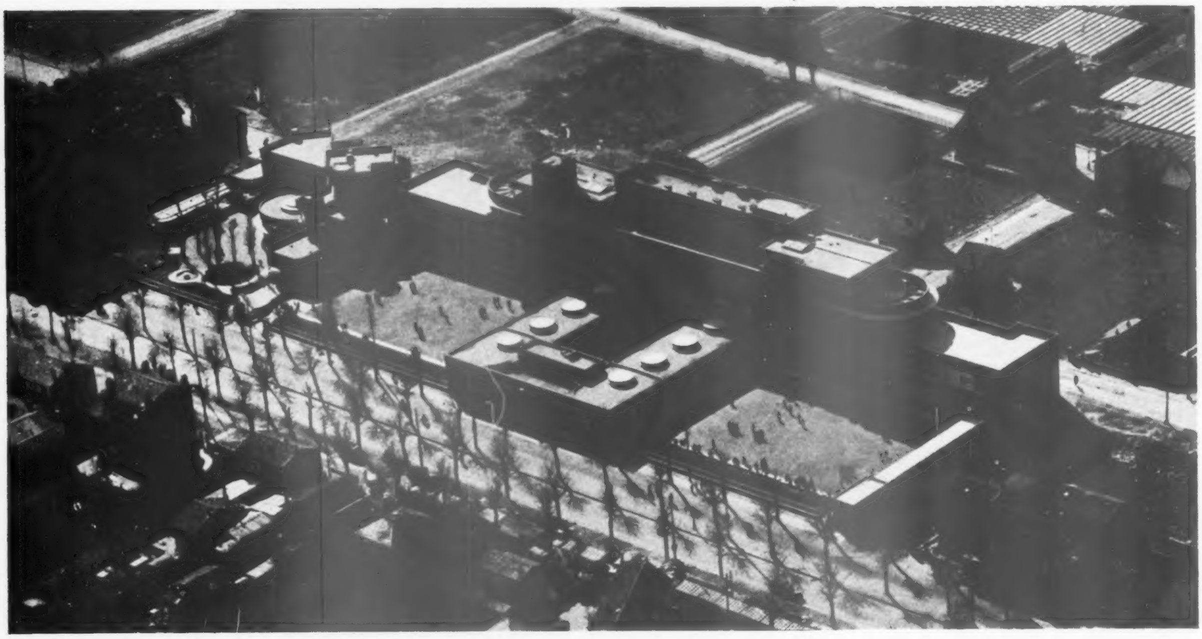


The Second Floor Plan



The First Floor Plan

The drawings show two perspectives of the main front and one of the main entrance hall.



JULES FERRY, FRANCE

By A. DUBREUIL and R. HUMMEL

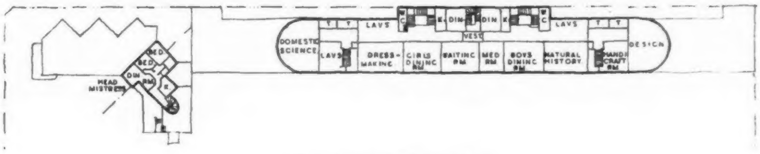
PROBLEM—A State school for 400 boys, 400 girls and 200 infants. The requirements included setting back the main buildings from the principal street, a lay-out resembling "garden courts" as much as possible, and two large covered courts for use in wet weather.

PLAN — The plan form results from the provision of the requirements on a fairly small site. The classrooms face east rather than south to avoid the strong sunshine of summer. The infants' department, where the children can be more easily moved to avoid a too hot sun, faces south. Other points which differ from English planning are : the corridor cloakrooms ; additional w.c.'s indoors ; flat roofs used for classes and physical training ; special rooms, dining rooms and medical inspection on the top floor ; and the supervisors' boxes. These last are occupied by a special grade of ushers who do not teach (having usually failed to qualify for so doing), but who are responsible for the children's behaviour and appearance in their playing hours.

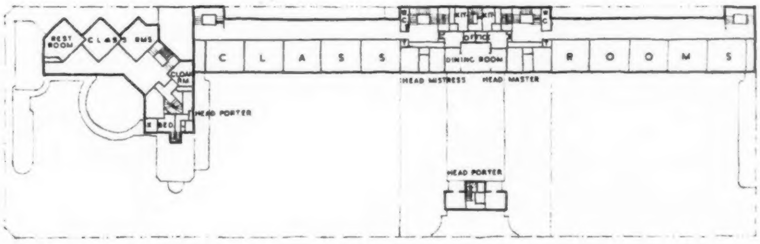
Above is an aerial view of the school from the north east ; left, a detail of the garden court between the covered play spaces.

MATERIALS--The building is of brick with partial R.C. framing and R.C. hollow tile floors. String courses and dressings generally are of pre-cast granite faced stone. Ornamental metal is of wrought iron. The floor finishes are generally of a cement and cork composition covered with linoleum. The kitchen and lavatory floors are paved with a dense reconstructed sandstone tile. Doors, windows and joinery details generally are of steel and sheet metal. Cills and hoods externally are of vitrified sheet steel. Partitions are of hollow brick, and wall finishes are of coarse plaster, finished with a washable paint. Roofs and covered courts are paved with cement flags on bitumen.

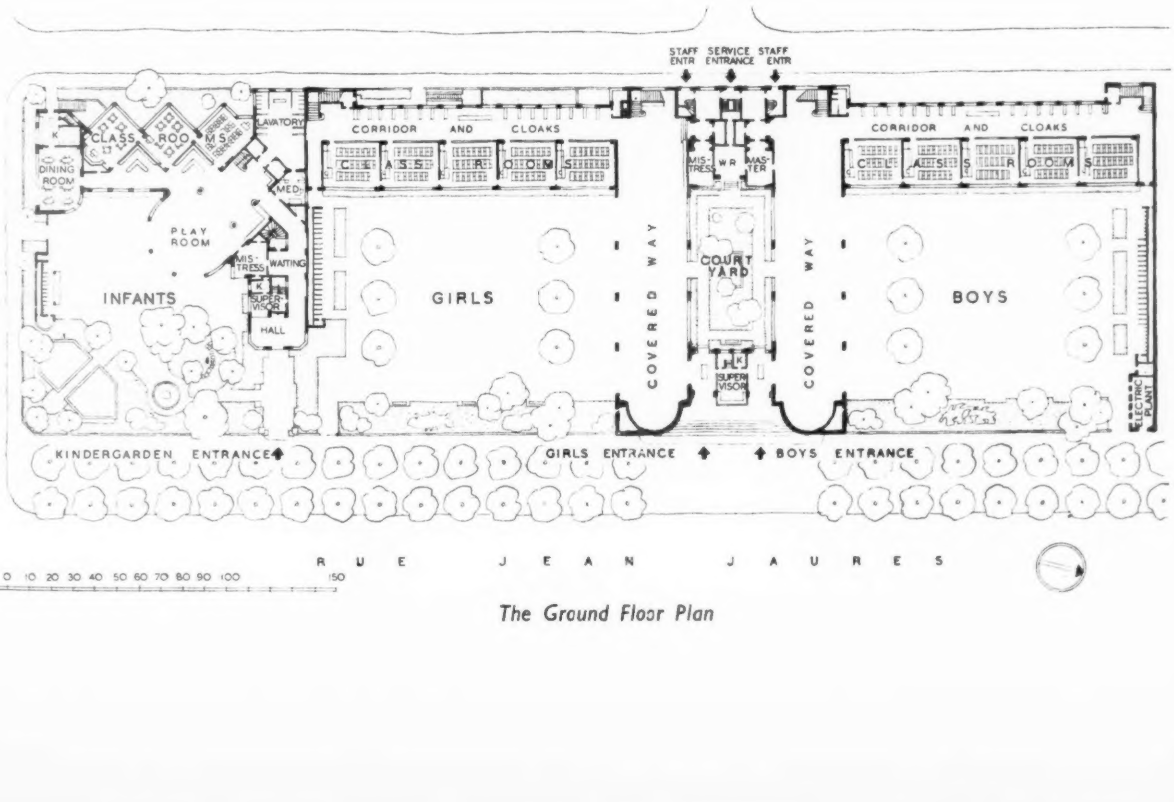
Right, a general view of the infants' play-room.



The Second Floor Plan



The First Floor Plan



The Ground Floor Plan

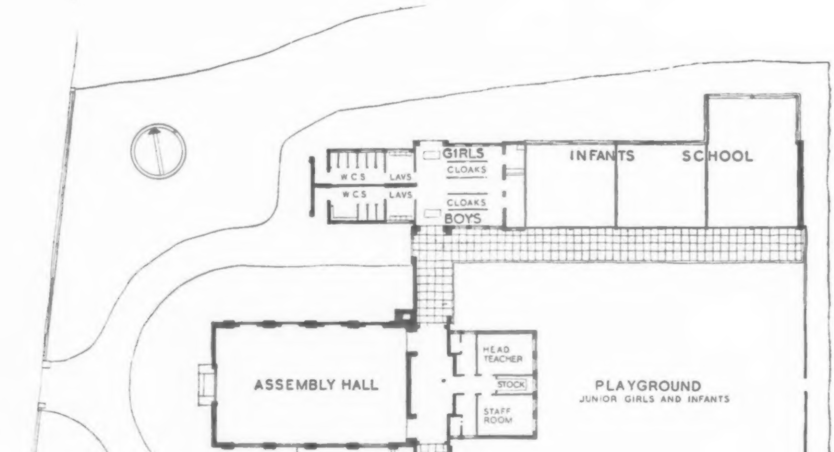
JUNIOR SCHOOL, DUDLEY

•

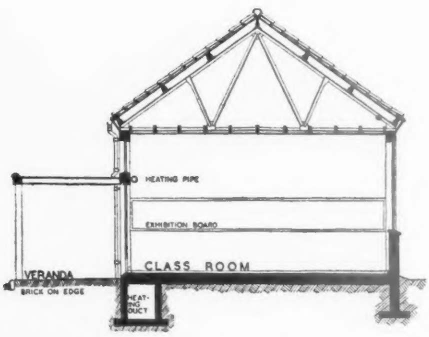
By BUTLER, JACKSON and EDMONDS

PROBLEM—A junior and infants' school to accommodate 400 children of both sexes; 50 to each classroom, of which two are to be built at a later date. The clients asked for an open-air type of school with a tiled and pitched roof.

PLAN — The levels of the site made a north and south aspect unavoidable for the classrooms. The veranda access is warmer by being placed on the south side, whilst south light enters the classrooms through clerestories.



The Ground Floor Plan



Section

CONSTRUCTION AND MATERIALS — The building is R.C. framed with a brick infilling on a reinforced concrete raft with light steel principals carrying the roof. The classroom walls are 11 in. cavity. Partitions are of plaster blocks skim coated with hard plaster, and ceilings are of fibre board.

The facing bricks are rustic wirecuts, veranda posts and metal classroom doors are finished royal blue and cornices and other woodwork are light buff. Metal windows are finished with aluminium paint.

Classroom floors are of wood composition and veranda floors of asphalt. Doors generally are deal painted royal blue. Cloakrooms have walls finished in cream and royal blue tiles and floors are of terrazzo.

The photographs show: left, the Junior school from the south; right, one of the classrooms.

C: PLANNING

THE DEVELOPMENT OF THE PLAN

BY R. ALLPORT WILLIAMS, B. ARCH., A.R.I.B.A.

THE importance of State-aided day schools in the life of the community has made such strides in the public estimation that the energy and expenditure now devoted to them could not have been foreseen fifty years ago. The realization of this rapid advance in policy has thrown on the Board of Education and all architects of schools a great responsibility. The criterion for judging any plan of to-day is not whether it is a good plan for present requirements, but whether it will meet those future needs outlined by recent changes in educational policy. The change can be compared with the public hospital, which with its great resources is able to command the best in technical equipment and human endeavour and so is gradually superseding the private nursing home. The work and the efficiency of these public hospitals has in time broken down the old prejudice that, because they were so large, attention could not be so individual. So also with the State-aided schools: the results of their work are beating down the prejudice against the expenditure of so much public money and the grudging attention they once received is now properly regarded as a matter for shame. In fact the pendulum has swung to the other side and every new and progressive idea of apparent value receives consideration. The chief limitation is, as always, the depth of the public pocket. But inasmuch as the value of education lies in preparing the children who are to be the citizens of tomorrow, it must be regarded as an investment of paramount importance to the State.

The Board of Education, appreciating the responsibility of investing such sums to the best advantage, are most anxious to investigate every fresh idea and to prevent the planning of schools taking any set immutable form until this has been done. By throwing open the planning of certain new schools to competition they put the architect in private practice on his metal to suggest solutions free from the restrictions with which committees are wont to bind their official architects.

This is a reversal of policy. On looking at the plans of schools towards the end of the last century it must be confessed that the architects in private practice fell far short of the requirements. The problem was new, and demanded a more careful analysis and research than they were able to give. By the appointment of official architects this handicap was removed and opportunity was given for a thorough examination of the problem. The results, where the architect was working in close collaboration with the medical authorities, were a great step forward.

The old plan, which consisted of a central hall off which were the various classrooms, was swept away. Its only advantage was a close supervision of very large classes by one teacher. With the increased number of teachers demanded by a more thorough and individual education the need for this close supervision passed, and a wide open plan took its place. It was realized that each class carries its own supervision with it and therefore close connection between the various classrooms was not essential.

At this point the medical authorities step in. The questions of light and air assume the greatest importance. Experiments were made with various arrangements of rooms and positions of windows, and from them certain definite data were established. In order to get each classroom flushed with sun each day, but at a sufficiently early hour to avoid discomfort from heat, the ideal aspect was found to be south-east. This meant that the connecting corridors were thrown on the north and west. In the desire for as much fresh air as possible they took the form of verandahs. These were often placed on the south sides for use as open-air extensions of the classrooms, but were found to keep off too much light in the summer months, when the classrooms themselves could be thrown open by sliding windows. The open verandah seems to cause great inconvenience in the winter from cold and wet, but this will be overcome if sliding windows are used so that they become in effect closed corridors.

It was established after experiments that natural cross ventilation was the best possible, as the movement of the air, over and above its pureness or humidity, plays a very important part in the comfort of the pupils. This led to the adoption of high windows above the corridors on the opposite side of the classrooms to the main windows. These two features of aspect and cross ventilation have now become standard English practice, and have led to a widely spaced plan, demanding a large site when allowance has been made for the playgrounds, etc. Special rooms requiring north lights, such as art rooms, etc., have naturally to be placed on the north side, with the lavatories, cloakrooms, and rooms only used for very short periods.

To counteract the danger of draughts from so much window area, hoppers are used to throw the incoming air up over the heads of the pupils, but they must not be used near the ceiling or a severe down-draught will result. A small hot water pipe is often run below the high north window to stop condensation. When French windows are used it is usual to set them on an 18-in. brick curb wall to avoid draughts at floor level.

With so much open window area, heating by convection resulted in great heat losses. The principle now adopted is to use radiant heat entirely. In this way the structure is kept warm and dry whilst the freshness of the air is not affected as in early forms of central heating. The most usual method is by means of panel heating in the floor or ceiling, which, because of the large radiant areas, need not be at any great temperature and is assisted by wall panels at particularly vulnerable points.

The structure may be of several types of construction, and except in the classrooms of open-air schools is generally permanent. The governing factor is naturally cost, in which upkeep as well as outlay plays an important part. Buildings of traditional brick, stone, or a combination of the two, have been usual, but reinforced concrete and metal are now coming to the fore and show a very appreciable saving in construction. But whatever the structure the question of acoustics must be carefully considered as it will influence both structure and finishes. Whereas hard plaster or harder material is necessary up to dado level to withstand hard usage, a lime or soft plaster above this point is highly desirable. In assembly halls

Overlarge Classes in England and Wales.

	No. of classes with over 50 children on the registers	Percentage of these to the total
1924 ..	24,958	17.0
1930 ..	10,017	6.6
1931 ..	8,571	5.6
1932 ..	7,986	5.2
1933 ..	8,296	5.5
1934 ..	6,138	4.1

and for light partitions special care must be exercised.

In England the demand for S.E. aspect for classrooms and north light for the remainder shows signs of becoming stereotyped into the quadrangle plan. This arrangement has the advantage of helping the circulation, and if the hall is centrally placed it makes it equally accessible from all parts of the building. But when the hall divides the central open space into two smaller quadrangles the noise during singing lessons or exercises is very disturbing to the classrooms which overlook the quadrangles. Its traditional association with the older universities is unfortunate and misleading. The older form rose from necessity for protection and because of confined sites. At its grandest, as at Trinity College, Cambridge, it represents a splendid achievement, but the size of the quadrangles in small schools make them not much more than areas with consequent shade and stagnant air, and must be deplored. It should be possible to devise alternative arrangements which are economical without losing any of the virtues of the recommended aspects for classrooms.

This suggests that a careful analysis of each unit is necessary in the search for essentials, and all other considerations may be cast aside.

The number and size of rooms required and divisions into departments are dictated by the educational authorities, but the siting and juxtaposition are settled by the architect in consultation with these authorities. Governing these positions are the particular requirements of each room and its accessibility. Each classroom carries its own control, so that a tight, compact plan is not a necessity, and the questions of health make light and air the main considerations. The Board of Education are very anxious to provide for conditions in the future, and welcome suggestions that represent an improvement on current practice. They fully realize that an ideal plan has not yet emerged, and state firmly that the existing layouts cannot be considered in any way to cater for the ever-growing and changing needs of school requirements.

There is now still a very regrettable discrepancy between the intention of the authorities and the building erected. In a new nursery school where the questions of light airy rooms and interesting colour schemes were employed, it is a shock to find buckets filled with straw instead of proper W.C.'s, and an absence of hot water for washing purposes. On these points being raised, it was a further shock to hear that hot water was purposely not provided, since it had had to be cut off from a neighbouring school because the children used it for washing handkerchiefs, etc. It is almost incredible that, whereas in certain town schools the chief problem is to teach the children to be clean and take a pride in themselves for reasons of health, in other schools it should be actively discouraged.

In spite of discrepancies of this sort the Board is anxious to free the designer and allow him to experiment, his only bounds the very wide and adjustable recommendations in their various "regulations." The few definite recommendations they incorporate can be easily worked in with fresh ideas for their consideration. But before studying the requirements of the detailed units of the building some notes on the sites and amenities will be necessary.

Site

The site should be sufficiently level to avoid undue expense in building or levelling, in an open situation with access from a minor road away from sources of noise, works, railways, traffic, etc., large enough to allow all rooms on the ground floor for preference, including any further extensions to bring the school up to its full complement, and have sufficient clear open spaces for play and organized games and facilities for open air teaching.

Arrangement on Ground Floor allows freedom for rearranging departments and admits provision of good cross ventilation.

The position of the buildings on such a site will be governed chiefly by the desirability of a South-East aspect for the classrooms, sufficient distance from sources of noise, and space necessary for lay-out of games.

Playgrounds

Adequate allowance should be made for playground and organized games. The playground, which in crowded city sites may include the flat roof over the building, must have the minimum areas shown below, but with the probable raising of the standard required, any opportunity of increased size should be eagerly grasped.

Cycle stalls should be provided at 10 in. centres with 15 ins. for end cycles. Each alternate cycle must have its front wheel raised 12 ins. above ground.

The use of playgrounds for physical training and games with set pitches necessitates rectangular shape, and the question of noise disturbing work in the classrooms must be studied. Playgrounds should be levelled and drained, paved with a surface from which grit and mud will not be carried into the buildings, and which are not interrupted by gullies or manholes. Tarmac, asphalt, and in certain cases concrete slabs are advised. Appropriate entrances must be provided to the playgrounds, which are separate for each sex, with the exception of those for Girls and Infants, who may use the same if the required areas are combined. Sanitary accommodation must be available from each playground without entering the school buildings.

The boundaries should be in permanent form. Wood palings are easily climbed and often expensive to maintain, and spiked iron railings dangerous to individuals and footballs, so a combination of chain paling on a low brick wall and a hedge are recommended. Where the grounds adjoin neighbouring property and there is likelihood of balls going over, a 12 ft. fence will be necessary. A green belt of trees is very desirable from appearance and educational standpoints and should be incorporated if possible. A playshed is a great advantage in wet weather, and a protected glass roof or windows will make it light and cheerful.

Playing fields adjacent to the school are highly desirable, and it should be borne in mind that the size of pitches

Table 1

CONDITIONS	NUMBER OF CHILDREN	MINIMUM AREA REQUIRED
No other provision for outdoor games..	Under 200 ..	2,000 sq. feet plus (1) 20 sq. feet for each older child. (2) 6 sq. feet for each younger child.
Ditto	Over 200 ..	(1) 30 sq. feet for each older child. (2) 16 sq. feet for each younger child.
Where ample provision exists for outdoor games off the premises.	Under 200 ..	2,000 sq. feet plus (1) 10 sq. feet for each older child. (2) 6 sq. feet for each younger child.
Ditto	Over 200 ..	(1) 20 sq. feet for each older child. (2) 16 sq. feet for each younger child.

Table 2

Winter Games

Football (Association) East and West	Main Pitch	100 by 70 yds. for boys from 14–16 years.	
	Smaller Pitches	80 by 60 yds. for boys from 12–14 years. 65 by 40 yds. for boys from 10–12 years.	
Football (Rugby) East and West	Main Pitch	100 by 65 yds.	Between goal posts. About 10 yds. behind each goal line will be sufficient.
	Small Pitch	80 by 50 yds.	
Hockey	Main Pitch	90 by 55 yds.	
	Small Pitch	80 by 50 yds.	
Shinty, Rugby Touch, Handball	Main Pitch	60 by 40 yds.	
	Smaller Pitch	50 by 35 yds.	
Netball		100 by 50 feet.	
Skittle or Post Ball		100 by 75 feet.	

should be graded to the ages of the pupils. The Board of Education recommended the following sizes for children from 11 to 15, which are given on previous page.

Summer Games

Cricket—Length of wicket—20 yds. or 18 yds. (North and South).

Field of play—A circle with a diameter of 100 yds. is adequate, but arrangement of pitches and age of pupils make this figure flexible.

Rounders—Field of play—Older pupils, 13–15, semi-circle 50–60 yds. radius. Younger pupils, 11–13, semi-circle 40 yds. radius.

If the site is too small for playing fields the nearness to a public park should be studied, and arrangements made for the use of a public park in the vicinity at certain hours. Alternatively two or three schools may share a playing field equidistant from each. Against the economy of outlay and upkeep of this arrangement must be set the difficulties of transport, traffic dangers, and time lost in travelling to and fro.

The latter difficulty is sometimes overcome by building two classrooms on the field for use by pupils prior to play periods.

The Schools under the jurisdiction of the Local Education Authorities cater for different types of children of differing ages. Inasmuch as the requirements of many given rooms remain the same they have not been separated in the following notes, but it is necessary to consider in what way they differ.

1. *Nursery and Infant Schools (ages 2–5, 5–7)*

The numbers are generally small to allow easy control and individual attention. The classroom is superseded by a gaily coloured playroom, for which the problems of light and air should be met in a generous way. The furniture should be light so that it can be moved about or put out of doors and provision made for rest periods. Good washing and sanitary accommodation, cloakrooms, and medical clinic are of paramount importance. A small kitchen for service of hot drinks and small meals is essential. By the introduction of these schools the poor child is removed at an early age from crowded and often dirty surroundings to where it can receive the attention and care which the hard and busy life of its mother is unable to provide. They represent a big advance in social services. The first open-air nursery infant school (2–7) was opened at Bradford in 1935.

The school period is divided into play, exercise, feeding, and resting, so the accommodation must be suitable for these purposes.

A sand pit in the playground is much appreciated.

2. *Elementary Schools (Juniors 7–11, Seniors 11–14)*

a: Council Schools. Built, owned, and maintained by the Local Education Authorities.

b: Voluntary Schools. Built, owned by Trustees (frequently the Church) of which the running expenses are paid by the Local Education Authorities.

The bulk of the information here collected applies to these schools and the dissimilarity between the buildings and those of Secondary schools is growing smaller.

3. *Central Schools*

Placed conveniently to several Elementary schools from which children of 11 and over may be drafted for a more complete education up to 15–16 years of age.

4. *Continuation Schools*

Provide education beyond the Central schools up to 18 years of age, but on a part-time basis.

5. *Special Schools*

Generally open-air and cater for children who are physically or mentally defective. These are dealt with more fully under lay-out of schools.

6. *Secondary Day Schools*

These fill in the years between Elementary schools and the Universities. In lay-out they are similar to the Elementary schools, but the classes are smaller (30 instead of 40). Because the pupils are older they require more space, and the more advanced form of study requires more elaborate equipment.

Lay-outs.

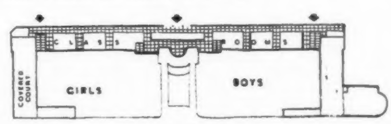
As the special requirements of the component parts are reviewed in another section of this number the evolution in lay-outs which they have caused is an important consideration.

1. *19th Century Central Hall*

All the classrooms were grouped round and approached through a central hall. Very close supervision of large numbers of pupils by one teacher was possible, but this is not so necessary now that the size of class has been much reduced. It has serious disadvantages in poor ventilation and the disturbance caused to all classrooms when the hall was in use.

2. *Quadrangle (Single and Double)*

As described elsewhere this plan is very popular, but, unless the quadrangles are very large, creates pockets of stagnant air and one block is likely to overshadow the other. This trouble is aggravated if the accommodation is placed on two floors. When the hall or gymnasium splits it into two, great disturbance can be caused to the classrooms facing the quadrangle. It is often difficult to give all classrooms the right aspect, particularly when two departments are balanced symmetrically each side of central hall.



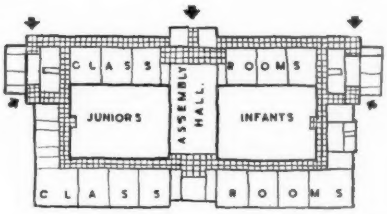
E Type

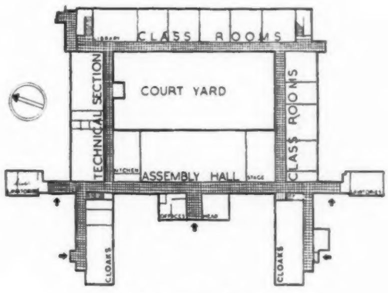
3. *U-shape Plan*

This form gives plenty of light and air, but may mean that the projecting wings are far apart unless accommodation is put on two floors. This is therefore a better solution for the small school than for the larger type, provided always that they are planned on one floor only.

4. *The H Plan*

This is a development to meet the objection of the closed quadrangle, but





Quadrangle Types

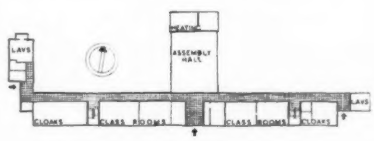
the difficulties of noise disturbance and overshadowing remain. The position of the axis of the hall gives solutions which differ considerably.

5. *L Shape*

This shape again is useful for smaller schools and is a convenient form on confined sites or where a projecting wing will give protection from strong prevailing winds.

6. *E Shape*

This is a development of the U-shape plan and enables use to be made of both sides of the main corridor with a minimum of light restriction.



E Type

7. *T Shape*

This form gives plenty of light and air, but the avoidance of long corridors necessitates more than one floor introducing stairs and difficulties of cross ventilation on the ground floor.

8. *Rectangular Z*

Is a variation of the T shape and has the same qualities and disadvantages. If the Hall is centrally placed and has a stage at one end the access from one wing of classrooms is more difficult. The central block can get better aspect, but care must be taken that it does not overshadow either of the wings. The arrangement lends itself to interesting elevational treatment.

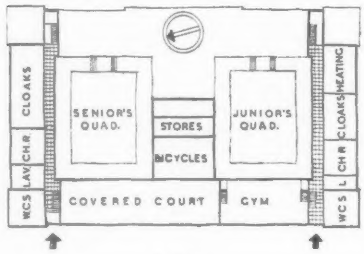
9. *Serrated*

A further development of the rectangular Z by the introduction of additional wings. Where the provision of correct aspect might demand a large projection into the playing fields, this type of plan may give an adequte solution. The division into small wings can be utilized departmentally and the result gives opportunity for interesting elevational treatment.

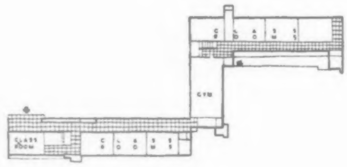
10. *Free Standing Open-air Classrooms*

The credit for the evolution of this plan lies to the architects who designed the first open-air schools. These have now been built in England long enough to have undergone a thorough testing, evolved to meet the special needs of physically defective children, they very quickly justified their existence. They are the logical conclusion of the cross ventilation theory. If children are suitably clothed the exposure to open air results in a rapid and marked improvement in health. *Sickly children make such rapid strides in these surroundings that it may be asked with vehemence why the same conditions are not utilized to maintain and improve the stamina of normal children.* The classrooms are planned with solid wall only on the North—the remainder being sliding screens of special glass to let in the ultra-violet rays. By this means driving rain and snow or gusty winds may be kept under control. The question of fog or drizzle is more difficult. This is met by the provision of radiant heat—already discussed in some detail. The structure is closed up and thoroughly warmed in the absence of the children, and the result is a dry working condition when opened up. In sunny days curtains or blinds are necessary. Solutions on these lines have been tried out in this country for many years, but one of the most successful lay-outs adopting this principle is in France at Suresnes. The illustrations (page 820) show clearly the clever use that has been made of the possibilities of this treatment. There is, of course, the chance of one class distracting the attention of the next, but this difficulty was overcome by Messrs. Cossins, Peacock and Bewlay, at Uffculme, by placing the classrooms corner to corner so that a view from one to the other was difficult. The rest sheds at the earlier schools are superseded by the flat roofs of these classrooms, which are approached along the roof of the covering way. Heating must be provided in the sanitary accommodation because of the danger of apparatus freezing up.

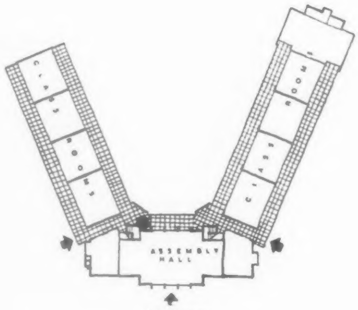
Owing to the lighter construction used and the cheapness of covered way against corridor there is little difference in cost compared with the older types of



E Type



Z Type



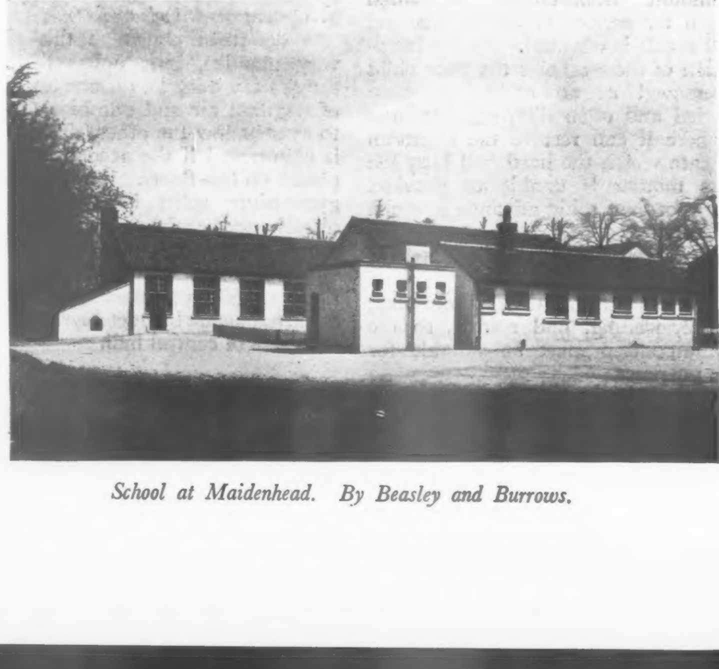
U Type

compact school of traditional materials. By the adoption of this arrangement the ordinary normal school child will have the same beneficial treatment hitherto only accorded to his weaker brothers and sisters. The introduction of competitions for school buildings seems to indicate a departure from established precedent, and an advance on these lines seems clearly indicated.

Architectural Expression

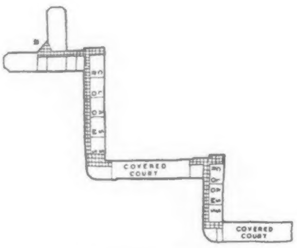
The elevations at the end of the last century all paid their tribute at the Gothic altar, and indeed this is understandable when one remembers that the whole system of education sprang from the days when it was entirely under the control and direction of the Church. But for the present spate of Georgian Town Hall elevations there seems little excuse. Beyond the fact that both are paid for by the public money there seems little connection between the early life of the child and the architectural expression of civic pomp.

If a classroom demands light along one side it seems logical to put a window the whole length instead of breaking it up into a pattern of solids and voids as an essay in architectural style. The fear that an adoption of a modern type of elevation would lead to aridity and a factory appearance is unduly pessimistic and contrary to the facts. But with possibly very few exceptions it is necessary to go abroad to see schools with elevations which truly express the needs of the plans and show by a careful use of proportion and texture, of colour and flowers, how delightfully gay and human and eminently suitable for children such a freedom can be. The Educational Authorities who look so keenly forward to the future in matters of education show by their policy of open competitions that they will not be tied by precedent. They will be ready to enlist the architect to help and will not cling to the porticoes and cupolas so much more symbolic of fully-fledged civic pride than the unfettered background which the child demands. Whereas the classrooms should be considered chiefly in relation to the child, the Hall may properly be treated as symbolic of the corporate life, not of sophisticated savants, but of young and high-spirited children. This may be more properly expressed in colour and simplicity than in outlay of architectural extravaganza. Nothing need be lost of dignity in the adoption of a new architectural expression for an outlook which has



School at Maidenhead. By Beasley and Burrows.

thrown away its old hard and fast relations of teacher and pupil dogma to replace it by an earnest system of inquiry in which all press forward together. The way of teaching the child how to think rather than what to think must have its architectural expression at last.



Serrated Type

Capital Expenditure of Local Education Authorities on Elementary, Medical Services and Secondary Education—i.e. for new buildings, extensions, alterations, sites, etc.

	Elementary £	Medical £	Secondary £
1925–26	3,476,664	218,426	2,016,480
1929	5,509,505	304,641	2,292,146
1930*	9,186,572	349,833	2,427,666
1931	5,938,012	160,350	1,283,263
1932	3,170,739	59,147	646,486
1933	2,719,793	58,035	534,837
1934 (9 Months)	3,290,774	95,488	640,893

* In 1929 Circular 1404 announced greatly increased Government grants on approved capital expenditure, but the offer was withdrawn on September 4, 1931.

Net Expenditure per Public Elementary School Child

1913–14	93.6d.
1920	179.11d.
1925	234.2d.
1930	256.4d.
1931	263.4d.
1932	253.4d.
1933–34	249.11d.

Nursery Schools

	L.E.A. Schools	Non-L.E.A. Schools	Total Schools	Total Accommodation	No. of children under 5 on ordinary sch. registers
1930	14	14	30	1,894	165,062
1931	23	21	44	3,305	158,427
1932	30	25	55	4,520	166,795
1933	32	26	58	4,765	163,252
1934	33	26	59	4,825	155,175

Comparison : French Nursery Schools

	Public	Private	Total Schools
1930–31	3,170	503	3,673
1933–34	3,332	476	3,808
1934–35	3,362	466	3,828

D : TECHNICAL

CONSTRUCTION

SOME NOTES ON RECENT DEVELOPMENTS

BY D. E. E. GIBSON, M.A., A.R.I.B.A.

IT may be said generally, that the choice of constructional forms should not be restricted in any way in the building of State-aided day schools. The spans, loads and heights are generally of a very medium range, and these considerations would not therefore be expected to limit the types of construction which are available.

Apart from any special circumstances which may influence a decision, the points of obvious major importance in selecting the types of construction to be used are :—

1. Strength.
2. Resistance to weather.
3. Suitability for purpose.
4. Cost in building.
5. Cost in maintenance (painting and repairs).
6. Running costs, such as heating, which would be influenced by the thermal insulating properties of the construction.

It is evident that it is not possible to fulfil all the above requirements using traditional forms of construction, without involving considerable cost in building. Recent developments in constructional design have, however, made this more possible, and the forms of building available, although not all of permanent construction, are considered to have an adequate useful life.

The question of permanency is one upon which the education authorities must make a decision. It must be recognized that many schools built less than 20 years ago are now out of date both in planning and accommodation and in fittings. It is probably safe to surmise that the same will be the case in the future, and a building with a useful life of 20 years, costing less than a building of more durable construction, would therefore be an advantage.

The preconceived idea that semi-permanent construction must be of a somewhat "inferior" appearance must be refuted. Semi-permanent construction offers equal opportunities for good design to other forms, and there are numerous finishes available.

The following notes are not intended to be comprehensive, and no attempt is made to discuss the older types of traditional building, except in so far as they are compared with other forms of construction. The notes are given rather with a view to suggesting directions in which developments may proceed.

For ease of discussion the notes are grouped under two headings—(*a*) Floors, (*b*) Walls.

Floors

The usual type of solid concrete laid direct on to the ground is probably still the most economical form of floor. A horizontal damp-proofing membrane is necessary under most types of floor finish, unless this should be itself an impervious material, whose adhesion to the concrete is not affected by moisture. Asphalt is an example of such a material, and this is known to be easy to clean, and capable of standing hard wear, and has the advantage of being non-slippery. Certain asphalts are now obtainable in several colours, and a smooth ground surface can be obtained. This material is also slightly ductile, and is able to bridge small structural cracks which may develop in the structural floor. Another new material which is now on the market which appears to possess all the advantages of asphalt is a rubber-cement compound.

These finishes would not be so good from the aspect of insulation as some of the composition floors and timber finishes, but this rather illustrates the fact that there is no material for floors of this type which is perfect in all respects, and in each case the pros and cons must be carefully weighed before a decision can be arrived at.

Probably the most important point in the design of floors is the possibility of eliminating deep and expensive footings and trenches below the walls. Where the building is of light construction the load can be easily carried on the floor slab, if this is reinforced, using the floor as a raft to distribute the load. Where no reinforcement is used, the floor could be separated from the "wall-base." The "wall-base" would itself act as a beam to carry the wall, and reinforcement could be inserted where necessary.

These points are illustrated in the diagrams 1 and 2 :—

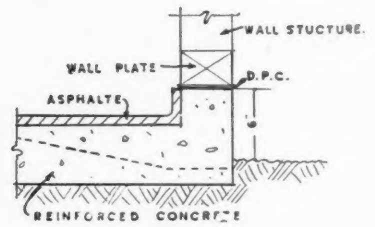


Figure 1

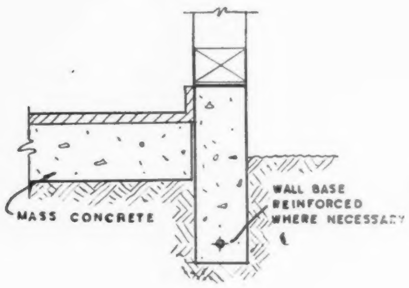


Figure 2

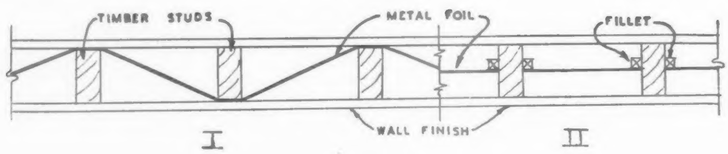


Figure 3

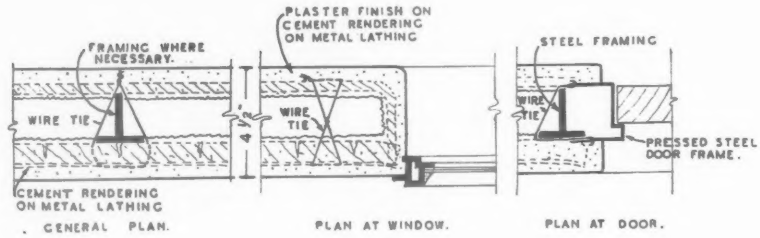


Figure 4

Walls

In wall structures the most important requirements are adequate strength, resistance to moisture penetration, and good thermal insulation.

The question of strength is one which depends upon design, and calculations will be necessary in the solution of any particular problem. No great difficulty appears to present itself on this account in any usual form of construction, and it is not therefore considered necessary to discuss this point here.

The prevention of the penetration of moisture through walls is, however, a more difficult problem. Where a wall is composed of an outer and inner leaf, with a cavity between, it should be easily possible by careful detailing to prevent moisture penetration into the interior. It is only in walls of solid construction that real difficulty may be experienced. A 9-in. or 13½-in. solid brick wall, although generally effective, may be liable to damp penetration under severe conditions. Solid concrete, even in thicknesses of 9 ins., if not of the best quality, may allow moisture penetration to occur, although 4 in. reinforced concrete, if sufficiently dense and impermeable can resist the penetration of moisture successfully. It is of vital importance, therefore, in a thin-walled reinforced-concrete structure in which no additional waterproofing membrane is present, to insure that the concrete is of a suitable quality.

In the design of walls, thermal insulation is a factor of considerable importance. Upon this depends the general comfort of the occupants and economy in heating costs.

The accompanying table indicates the approximate values of thermal resistance which may be expected from several of the more usual forms of construction.

Construction or material	Thickness in inches	Thermal Resistance. No. of Hours for transmission of 1 B. Th. U. per sq. ft. per degree F. difference in surface temperatures
Stock Brick (Dry)	4½	0·75
,, ,, ,,	9	1·50
,, ,, ,,	11 (2in.cavity)	1·90
,, ,, ,,	13½	2·25
,, ,, ,,	18	3·0
Stock Brick (Wet)	4½	0·4
,, ,, ,,	9	0·75
,, ,, ,,	11 (2in.cavity)	1·45
,, ,, ,,	13½	0·9
,, ,, ,,	18	1·2
Air cavity with metal ties	2	0·4
Air cavity with no ties	2	0·8
Cork Slab ..	1	3·3
Wall board ..	½	1·25
Cement rendering	1	0·3
Plaster ..	½	0·15
4 in. reinforced concrete ..	4	0·63
4 in. concrete + 1 in. cork + ½ in. plaster ..	5½	4·1
4 in. by 2 in. studs + aluminium foil, asbestos cement outside, wall-board inside	5	4·7

It will be seen from the above table that the wall consisting of 4½ in. timber studding, using an aluminium foil to subdivide the cavity, is superior to even an 18 in. solid brick wall. The purpose of the metallic foil is to reduce the heat losses both by means of providing a metallic reflecting surface in the cavity, and also by subdividing the air cavity into smaller units, thus discouraging the tendency of convection currents to form inside the cavity.

The alternatives I and II in figure 3 show how a foil of this description may be incorporated in a structure composed of vertical timber studding.

The method indicated in diagram II would be expected to give slightly better results than I, but the extra expense in labour and fillets would not justify its adoption in most cases. As shown in diagram I, the foil, which is obtainable in long rolls, is merely draped between the studding, and held in position by tacks.

In walls of solid construction, such as thin reinforced concrete, good thermal insulation can be obtained by the use of cork or some other material having good thermal insulating properties. A 4-in. reinforced concrete wall, with a 1 in. lining of cork on the inside, would have better insulating properties than an 18-in. wall of solid brick construction.

When cork is used in this way, it should be placed in the shuttering when the concrete is poured, and the moisture movement of the cork should then be sufficiently restrained to permit a hard-wall plaster finish to be applied

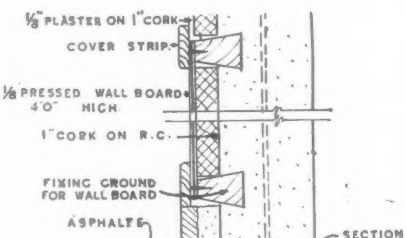


Figure 5

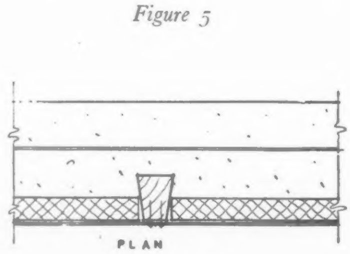
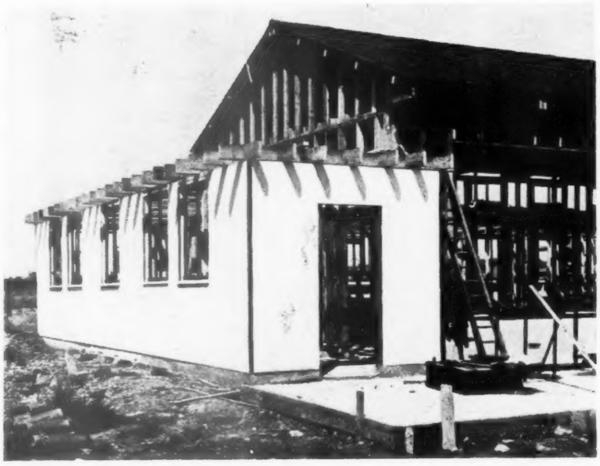


Figure 6




A nursery school of timber and asbestos sheeting. The right-hand photograph shows the light timber frame completed, and on the left the standard 8 ft. by 4 ft. asbestos-cement sheets are being placed in position.

without any undue risk of cracking. A suggested detail for an external corridor wall of this type is shown in figures 5 and 6.

Another form of construction which is worthy of more extensive use is that in which a light steel frame is first set up, and metal lathing applied to this, after which it is rendered. The metal lathing can also be applied internally, forming a hollow wall. The thermal insulating value of such a wall would not be great, and would lie somewhere between that of a $4\frac{1}{2}$ in. and a 9 in. solid brick wall. This construction should facilitate rapid erection and great freedom in planning.

Figure 4 shows the possibilities of this type of construction.

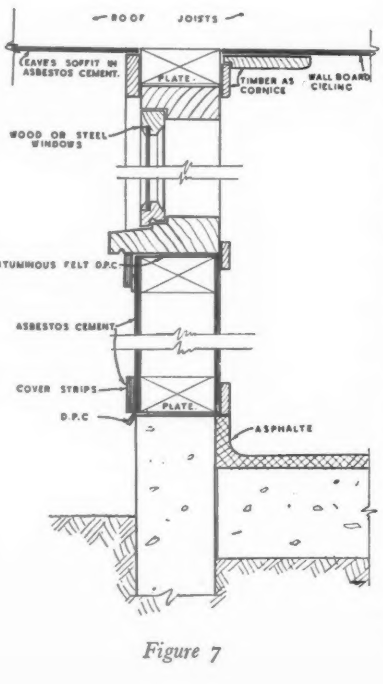


Figure 7

In buildings erected with timber as the structural members, an external facing of either weather-boarding, rendering on metal lathing, or asbestos cement sheeting might be used.

The accompanying photographs and figure 7 will give some indication of the simplicity of the details, and the manner in which the studding has been arranged to accommodate the standard unit of sheet which, in the case illustrated, was an asbestos-cement external sheet with a standard size 8 ft. by 4 ft.

Externally, the joints between the sheets were covered with an asbestos cement fillet, and this eliminates the necessity for maintenance in painting, and danger of warping which is generally associated with timber when used in this manner.

An asbestos wallboard having good thermal insulation was used internally, and no decorative treatment was considered necessary. The use of asbestos cement externally and asbestos internally would result in a reduced risk of damage from fire.

A method of timber construction which has now been employed for some time, mainly in Ireland, is one in which a cement rendering is applied to a hessian membrane, which is itself draped over the studding.

The method of construction is simple and very rapid, and does not call for very highly skilled labour.

The hessian membrane is made with a very open mesh, approximating $\frac{1}{4}$ in. in size. The hessian is stretched across the studding, to which it is secured by flat-headed nails. The hessian is then given a coat of cement grout, in such a way that the cement grout which is "painted" on one side passes through to the other side of the hessian. Wetting by the slurry stretches the hessian, and when the slurry has set there is an even surface upon which a floating and setting coat of sand and cement may be applied.

A similar treatment can be carried out internally, the cement undercoat being finished in plaster. Windows can be set into wooden frames, or metal casements can be fixed directly into the cement rendering. Timber which is intended for use in the external studding should be treated with a preservative to prevent decay, since it will be in direct contact with the external rendering.

Several other forms of external and internal finish have actually been used in experimental buildings abroad and of these the most interesting is the use of a metallic external finish. This has been carried out in a building in California which was designed by R. J. Neutra. In an experimental building which was erected at the Architectural League Show in New York in 1931 the external walling consisted of an insulating board covered with building paper to serve as waterproofing, and corrugated aluminium fixed with aluminium screws and washers, as an external facing.

It may be said, generally, that the possibilities of developing new forms of semi-permanent construction are very extensive. In the past this type of construction has generally consisted of a collection of materials and fittings which were primarily intended for use in conjunction with more traditional forms, and the result has not always been satisfactory. The development of new forms to meet the new requirements can only be met by the cooperation of the architect and the manufacturer.

Roofs

The question of roofs has not been discussed here, since the constructional roof forms which are associated with schools do not differ from those of other types of building.

H

D: TECHNICAL

HEATING, LIGHTING AND VENTILATING

RECENT DEVELOPMENTS

BY A. GORDON ALEXANDER, A.R.I.B.A.

ON rare occasions, when Nature permits, a glimpse of what perfect warming, air-conditioning and lighting really is may be experienced. No warming system conceived by man has ever yet reproduced the conditions of a fine day in mid-ocean or the refreshing breezes and dustless air of a sunlit day in the Swiss Alps. Nor has any artificial lighting system yet been evolved to produce the perfect lighting conditions to be found in the shade of a tree at noonday on a sunny day in June.

These are ideals set by Nature for the guidance of man. The scientist strives to analyse, the expert struggles to attain, but the majority of us periodically blow our noses and adjust our spectacles and live in hope.

However, the effort *is* made, and to some effect. Warmth enters our homes today in a much more perfect and healthy condition than it has ever done in the past and light is sought as a welcome guest and not held at bay with lace curtains and venetian blinds.

Perhaps this new outlook on the value of correct warmth and light in the home is a result of the lessons learned sub-consciously in the school. Good heating and lighting conditions should be essentials there and much progress has been made during the last few years towards ideal conditions, although, unfortunately, much remains to be done.

Heating

The heating engineer is the expert consultant, and it is his privilege to weigh the advantages and disadvantages of the various systems in relation to the building to be heated and the money available.

It is essential, however, that the architect, who is responsible in the long run for the efficiency of his building, should have a good working knowledge of the different systems of producing and distributing heat in buildings which are now in use.

Much has been written on the various systems of producing warmth in schools, and there appears little necessity to describe in detail the relative advantages and disadvantages of one over the other.

There have, however, appeared lately new methods of production and distribution which should be of interest. The low-pressure hot-water system still holds its own against new-comers, but it is to the application of the system that much attention has been given.

Production of Hot Water

In the production of hot water the following fuels are available :

1. Electricity.
2. Oil.
3. Gas.
4. Solid fuel.

Electricity

It will at once be agreed that electricity, for its ease of control, cleanliness and general efficiency, is the best medium for producing heat. Were it not for its high cost, it would undoubtedly be used almost universally. Thus, the demand is there waiting for the producer to supply current at a lower cost, and this is gradually being achieved.

The two methods by which electricity may be used as the heating element in a low-pressure hot-water installation are the electric thermal storage system and the electrode water-heater system.

Thermal Storage

The thermal storage system may be likened to an electrical or other type of accumulator in which the accumulated energy is available for use during the non-charging period.

The amount of accumulated energy must therefore be sufficient to meet the demand during the non-charging period.

Enterprising supply companies, anxious to even up the " valleys " in the generating station load curve, offer reduced rates varying from a farthing a unit for electricity taken during prescribed off-peak hours, and the water heating load is one which the electricity supply companies are anxious to develop.

Water, having a higher specific heat value than any other substance, and being of negligible cost, is almost universally used as the heat storage medium. The direct

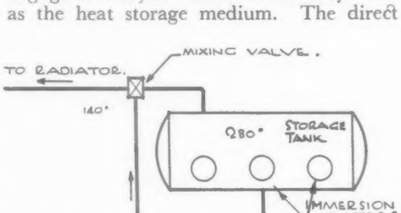


Figure 1 : Diagram of electric thermal storage system

storage of water has the further advantage that it may be directly circulated through the heating system without the intervention of calorifiers, or other heat-transmitting devices.

The general idea of the system is shown in the accompanying diagrams (Figs. 1 and 3). The storage tank with perhaps three immersion heaters contains the water supply, which is heated up to a temperature of about 280 degrees during the off-peak period. When the water is supplied to the radiators, this temperature is reduced by means of a thermostatic mixing valve installed on the hot-water outlet from the storage vessel. Part of the cooler water from the heating system is by-passed and intermixes with that leaving the storage vessel to produce a flow temperature corresponding to the setting of the hand-controlled temperature indicating valve attached to the " mixer."

Electrode Water Heaters

In the electrode water heater the system is varied. The water heater is a self-contained unit connected to the storage tank as indicated in the diagram (Fig. 2). The

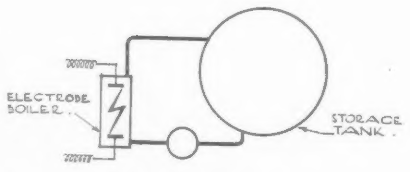


Figure 2 : Diagram of electrode water-heater system

boiler consists of the simplest form of earthed metal shell fitted with insulated live terminals or electrodes. Current passes from electrode to electrode through the water, the resistance of which produces heat.

In each case the capacity of the storage vessel is determined by :

(1) The quantity of heat in B.T.U.'s to be provided during the non-charging period.

(2) The maximum average temperature to which the water in the storage vessel can be raised.

(3) The mean flow temperature during the non-charging period.

On account of the space required for the storage of hot water, there is little or no saving in the size of the boiler room required in the electric thermal system over the usual solid fuel boiler type. There are distinct advantages in the absence of dust and dirt from coal and coke, ease of control and general efficiency.

It will be found, however, that only in very few districts is the system yet justified on the question of initial cost and running cost. It is the opinion of experts that, until electricity can be obtained at five units for one penny, or at least three units per penny, this system cannot hope to compete, on plain financial grounds alone, with a system in which the hot water is produced by coke-fired boilers.

Direct Electrical Methods

The direct electrical methods of heating are decidedly the most convenient and cleanest of all central heating systems.

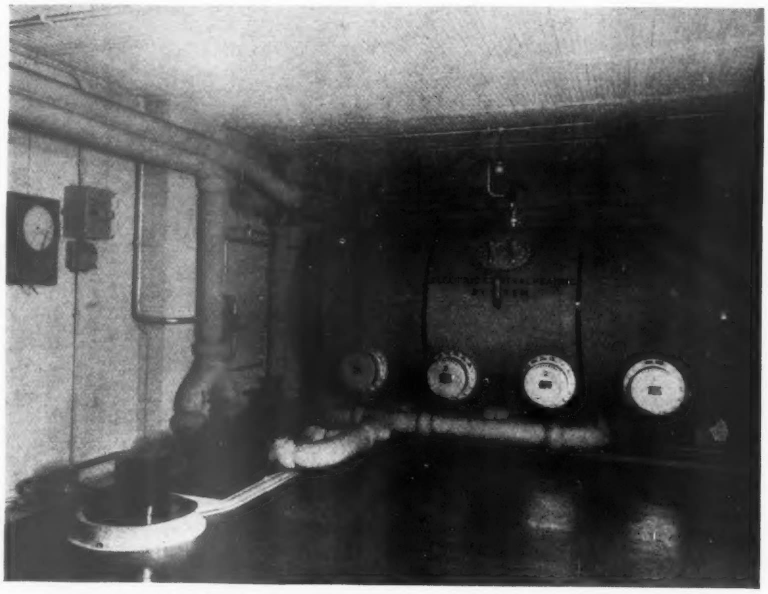


Figure 3 : An electric thermal storage heater with four immersion heaters

Figure 4 : Oil-fired boilers

The heat supplied may be automatically and instantaneously controlled.

Radiant electrical heaters are considerably more pleasant than the convective source of heat, and it is also claimed more economical in electrical consumption.

For general central heating the tubular heaters, now obtainable in an oval section as well as a round section are perhaps most generally used. These consist of electric heating elements placed inside steel tubes which are fixed to the walls of the space to be heated. The amount of heat emitted by radiation and convection, in this type of heater, is approximately the same.

Here again, however, the cost has proved excessive. In one school fitted with these and other types of electrical methods of heating, it was found that the cost of electricity at seven-eighths of a penny per unit amounted to a total cost for a complete heating season of approximately £250. In another school of similar capacity and requirements, but heated by the more usual low-pressure hot-water system, the cost of coke at £1 12s. 2d. per ton for a full heating season amounted to a total cost of approximately £50. Even the saving of labour in the case of the electrical system failed to make up the difference.

It would appear that until the cost of electricity is reduced to a considerable degree, there can be little progress, on the count of cost alone, in the electrical heating of schools.

Oil

Oil - fired boilers, although they are efficient, clean, automatic and reduce labour costs, have not received much encouragement since the duty on oil was imposed.

Before the days of the duty, however, it was proved by the comparison of practically identical schools, one with oil-fired boilers and the other with coke-fired boilers, that in the actual running costs over a full heating season, the oil was approximately 10 per cent. cheaper than coke. But when depreciation of oil-firing equipment was taken into consideration, there was an increased cost of about 17 per cent. for oil over coke.

Now, of course, this latter figure will be greater, and it is doubtful whether Education Authorities will feel justified in providing oil-fired equipment until a lower price for oil can be obtained.

It is interesting to note that the London County Council, the largest Education Authority in the country, who have 1,800 school boilers under their control, have not one which is on the electrical system, oil fired or fed with mechanical stokers. The latter omission is, no doubt, due to the fact that a caretaker, being necessary anyway, may as well stoke the boilers.

Gas

Coal gas as a fuel has the advantage that, like electricity, it is always on tap. Also no fuel store is required, and the boiler-room space needed for a gas-heated system is relatively small.

It is used extensively for cooking, domestic hot water and for a multitude of industrial purposes, but for some reason difficult to account for it is not used so much for the central heating of schools as might be expected.

Many gas-fired boilers of excellent design are available for hot-water heating, but there are very few schools heated in this way.

Distribution of Heat

It is perhaps in the distribution of heat that more development has taken place recently than in the production of heat. In this direction the architect has perhaps had more influence over the engineer than might be supposed. It is a generally accepted fact that the architect cannot bear to see any exposed pipes. Radiators must

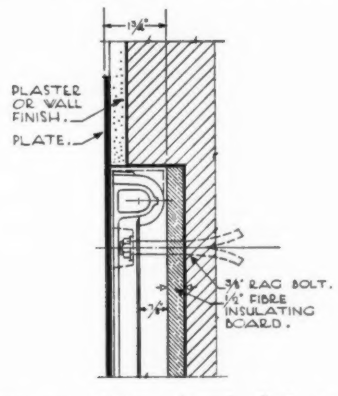


Figure 5 : Section through flush panel radiator

appear to have no connection whatever with the boiler house, and hot water taps must instantly produce hot water from no visible means of supply.

It is said that panel heating was first discovered by an architect, following his efforts to hide the offending pipes. Whether this is so is open to question, but there is now a good deal of evidence that the heating engineer has studied this question of concealed pipes in a very scientific manner and has produced in recent times

Figure 6 : New type of radiator fitted to ceiling of a domestic science room

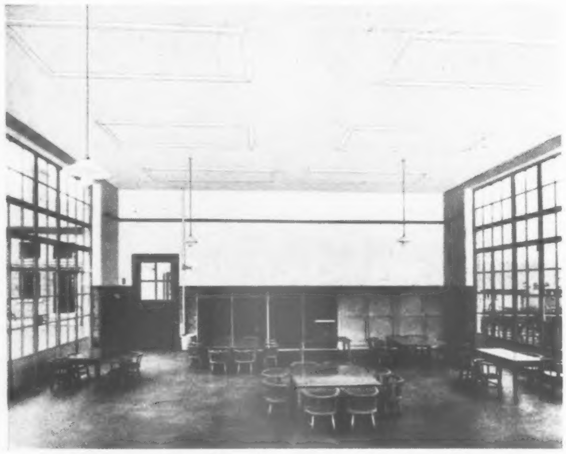


Figure 7 : Panel radiators fitted to the ceiling of a classroom

radiators to satisfy the most pipe-conscious architect.

The latest type of radiator to come on the market is one made up in sections comprising a number of waterways connected together with right and left hand threaded internal nipples. The construction varies according to type, the sections being either shaped to enable steel plates to be attached thereto or cast complete with the plate, each presenting a flat surface to the room.

Hot water or steam passing through these waterways warms the radiator throughout by conduction. This radiator may be fixed to ceilings or floors as well as to walls, a fact which commends them for use in schools where wall space is distinctly limited.

This type of radiator warms the air of a room to only a relatively small extent, depending, as it does, on the long-wave thermal rays which it produces, becoming converted into heat upon striking the occupants or fabric of the room. These in turn become heat distributors. Thus a comfortable warmth is produced in a room without baking the air and creating a stuffy atmosphere.

Another type somewhat similar is a border panel recently put on the market. The diagram (Fig. 9) illustrates the effect produced by this type. It will be noticed that the lowest temperature is found at the ceiling level and not at floor level as with the ordinary type of radiator (Fig. 8). This is a distinct asset when it is remembered that the object of a heating system is to keep the occupants of a room at a comfortable temperature and if this can be done without having to heat the whole of a room then the scheme is economical and sound.

The covering of this panel may be in any material unaffected by heat, such as marble, tiles, etc., which even in a classroom with wood block or boarded flooring could be designed in quite an effective manner.

Panel Heating

Panel heating consists of a network or grid of small pipes bedded in the plaster surfaces of a room. The pipe coils are usually ½ in. to ¾ in. in diameter and are arranged at either 4 in. or 6 in. centres. The maximum length of piping used in any one coil is usually limited to 200 ft.

Relatively low temperatures are employed in order to reduce, so far as is practicable, surface cracking and disintegration of plaster. Usually the plastering material is made up to a special specification. The floating coat may be pit sand and a special plaster and the setting coat washed sand and special plaster into which is worked a loosely woven canvas rim reinforcement.

In new concrete buildings it is quite common practice to place the pipe coils on the face of the shuttering before the concrete is cast. This is contrary to all theories of expansion but appears to be successful in practice.

In the Chapel of Trinity College, Cambridge, the consulting engineer, W. E. Fretwell, Esq., M.R.S.I., M.I.H.V.E., advised the use of panel heating in the floor as no space was available on the walls or the ceiling. The stone floor was partly removed and the pipes laid down and bedded in sand to cover expansion. The flooring slabs were then relaid and the chapel left in appearance exactly as before the work was started. The scheme has been a complete success, the floor being heated to a temperature of about 70 degrees.

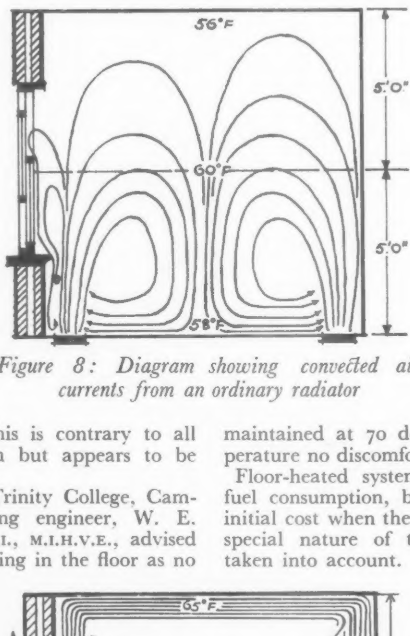


Figure 8 : Diagram showing convected air currents from an ordinary radiator

The entire warming of floors by hot-water pipes has been successfully applied to schools, the surface temperature being maintained at 70 degrees, at which temperature no discomfort is experienced.

Floor-heated systems are economical in fuel consumption, but more expensive in initial cost when the increased amount and special nature of the builder's work is taken into account.

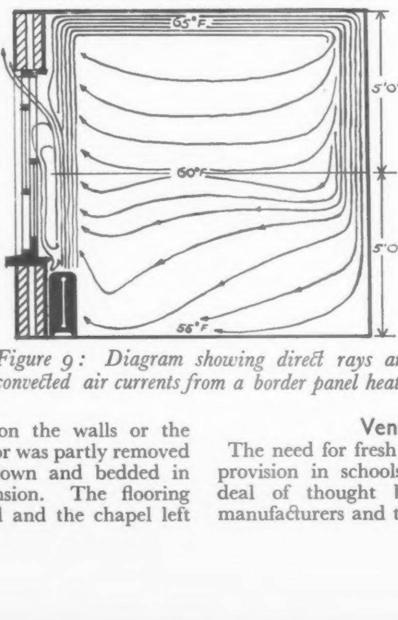


Figure 9 : Diagram showing direct rays and convected air currents from a border panel heater

Ventilation

The need for fresh air is universal and its provision in schools has received a good deal of thought by engineers, window manufacturers and the people who actually work in schools. Everyone who wishes to exist at all must breathe, and the quality of the air provided in our buildings for this necessity warrants the utmost consideration from the health point of view.

The American Society of Heating and Ventilating Engineers have recommended closed windows and mechanical ventilation in school buildings. The teachers in them, however, advocate open window ventilation, and apparently a deadlock has resulted; a sorry state of affairs, especially for the children in the schools.

In this country, fortunately, there appear no such extremes of thought. The principle of the American society's scheme is that by sealing the schools better control is possible in their efforts to produce an even temperature in the school all the year round, better air conditions and ventilation are obtainable by mechanical means and less dust and dirt is harboured.

This may be true, but there is undoubtedly a bad psychological effect produced on the child when a bright sunny day arrives and no windows are available to open to admit the fresh air and direct sunlight which no mechanical ventilation system has ever yet reproduced.

The ventilation of schools in this country has progressed in recent years on the open-air principle and it would appear from results that this is not far wrong. Given adequate cross ventilation in the winter, a thing very easily obtained with the many admirable types of school window now on the market, and the ability to open practically the whole of one side of a classroom during the warm sunny days, there can be little wrong with present-day practice so far as our present standards go.

It may be that in a few years' time we may see a compromise made in American schools, and even in our schools, between the hermetically sealed schools and the open-air buildings. Both have their distinct advantages in the proper season and in the proper place, the value of each depending largely on the situation of the school.

Natural Lighting

The characteristics of good lighting, both natural and artificial, are :

(1) Even distribution,

(2) Absence of glare, and

(3) Absence of any too bright source of light.

For classrooms with the usual window openings and areas, the illumination will probably vary from a few hundred foot candles near the windows to ten foot candles or less near the opposite wall, while the illumination out of doors, even on a cloudy day, may average 500–1,000 foot candles or more.

It will be seen therefore that present classroom lighting falls very far short of that which exists under the open sky. The human eye evolved under the high values of illumination which are present out of doors by day. Only in comparatively recent times has long-continued close visual application been practised.

It may appear therefore regrettable that the human eye, while required perforce to remain indoors, should not be able to enjoy the natural light available, at any rate to a very much greater extent than it does at present in classrooms. The present design of school windows, while satisfying the needs of ventilation, is obviously not performing its chief duty as it should. The direct light of the sky is restricted to a small area near the windows, most of the light available being shut off by the ceiling and the roof.

Whilst it is agreed that a ceiling and a roof are necessary, and also that skylights are not good practice in a classroom because of the confusion of shadows, it is suggested that if the light of the sky were admitted in an oblique manner from the left there would be no resulting confusion, and direct light from the sky would be permitted to reach to the wall farthest away from the windows.

The windows now used to light the operating theatre of a hospital are designed to admit the maximum amount of daylight practicable to the room, and it is suggested that windows of this type or of similar design should be used in classrooms.

It is true that these hospital windows face north to obtain a very clear diffused light, and it may be thought that windows of this type in a school having the approved south-east aspect will obtain too much direct sunlight. This, however, may be well diffused with suitable gauze screens, special glazing, or even light-coloured blinds without reducing to any material extent the amount of daylight admitted.

It is considered that as much light is necessary for the operation of inserting knowledge into the human mind as is required for the operation of removing the appendix from the human body. The eye is by far the most important medium by which pupils learn, that being the means by which numberless visual impressions or images are taken in. If the lighting and visual conditions are such that these images are taken in rapidly and clearly then a lesson will be learned more quickly and with less fatigue; a consideration apart from the more important fact that the eyesight will be preserved.

The present preference for one-storied schools would further simplify the application of this type of window, although the architect may experience some difficulty with his elevations. This is a minor matter, however, and may be safely left to the ingenuity of the individual architect (and to assessors?).

It is considered that, should this generous lighting be adopted for schools, the general national standard of eyesight would improve to a considerable degree, with consequent better health in the child and less fatigue.

Artificial Lighting

The classroom, being the most important unit of a school, should be given very close study in the form and strength of artificial light to be provided.

The ideal solution to the problem would undoubtedly be a form of totally indirect lighting that could be concentrated in a few sources of great intensity. If these were set behind or to one side of the pupils' desks and above eye level, the resulting light would be properly directional and diffused and as nearly approximating daylight conditions as possible.

Unfortunately, there is no known technique for doing this successfully. The next best is a combination of totally indirect and totally direct sources, supplemented perhaps by separate blackboard lighting.

The points to be considered in designing the lighting are :

(1) Intensity.

(2) Glare.

(3) Distribution.

(4) Colour.

There are many views on what is considered a suitable intensity for classroom lighting. The intensity recommended by the Electric Lamp Manufacturers' Association for ordinary classrooms is 7–9 foot candles. Some manufacturers of lighting fittings for schools recommend an average of 13 foot candles.

It is considered that neither recommended intensity nor that found in even our better lighted schools is anywhere near that which may be considered desirable.

It should be borne in mind that statistics show that short-sightedness and other optical troubles are on the increase amongst children and any calculations for the intensity of light should be based on the weakest sight to be catered for and not the best.

Good lighting will have an immediate result upon the speed and ease with which lessons will be learned. It will be of interest to quote here the results of experiments described in the "Architectural Forum" of January, 1935, relating to intensity :—

"In considering the relationship between the time of seeing, which is called 'perception time,' and intensity of illumination, 15-20 foot candles is the minimum for normal speed of perception. This applies to the normal eye, but when the astigmatic eye is tested this intensity must be increased.

Figure 10 : Special lighting in an art room

"The astigmatic eye requires a minimum of 25 foot candles to equal the perception time of the normal eye at 15 foot candles.

"These figures are based on the needs for vision without regard to the performance of any task depending on it. These minima must still be further increased if the maximum 'work benefit' is to be obtained. This attains an effective value at 30 foot candles and for astigmatic eyes at 45-55 foot candles."

It would appear, then, that an average of 50 foot candles, an intensity far above present recommended figures, is to be desired for classroom lighting and it is becoming increasingly apparent that artificial lighting of this degree will before long be regarded as a necessity. In a series of tests carried out by the E.L.M.A. it was clearly demonstrated that when a number of children were given the free choice of the amount of light which they found suited them best, the majority chose an intensity of 50 foot candles.

In considering the type and colour of lamps required, it is suggested that the incandescent filament lamp is now inefficient and costly to maintain. Lamps containing a combination of incandescent vapours may now be adjusted to produce an approximation of daylight about 90 per cent. correct.

A disadvantage of these lamps is that they require current of a high voltage stepped up by small transformers placed near the lamps to avoid the necessity of much length of heavy wiring and also that they may develop the "jitters" through faulty connections.

They do not, however, burn out as quickly as the filament lamp and the colour can be adjusted to suit the particular use and room for which it is required.

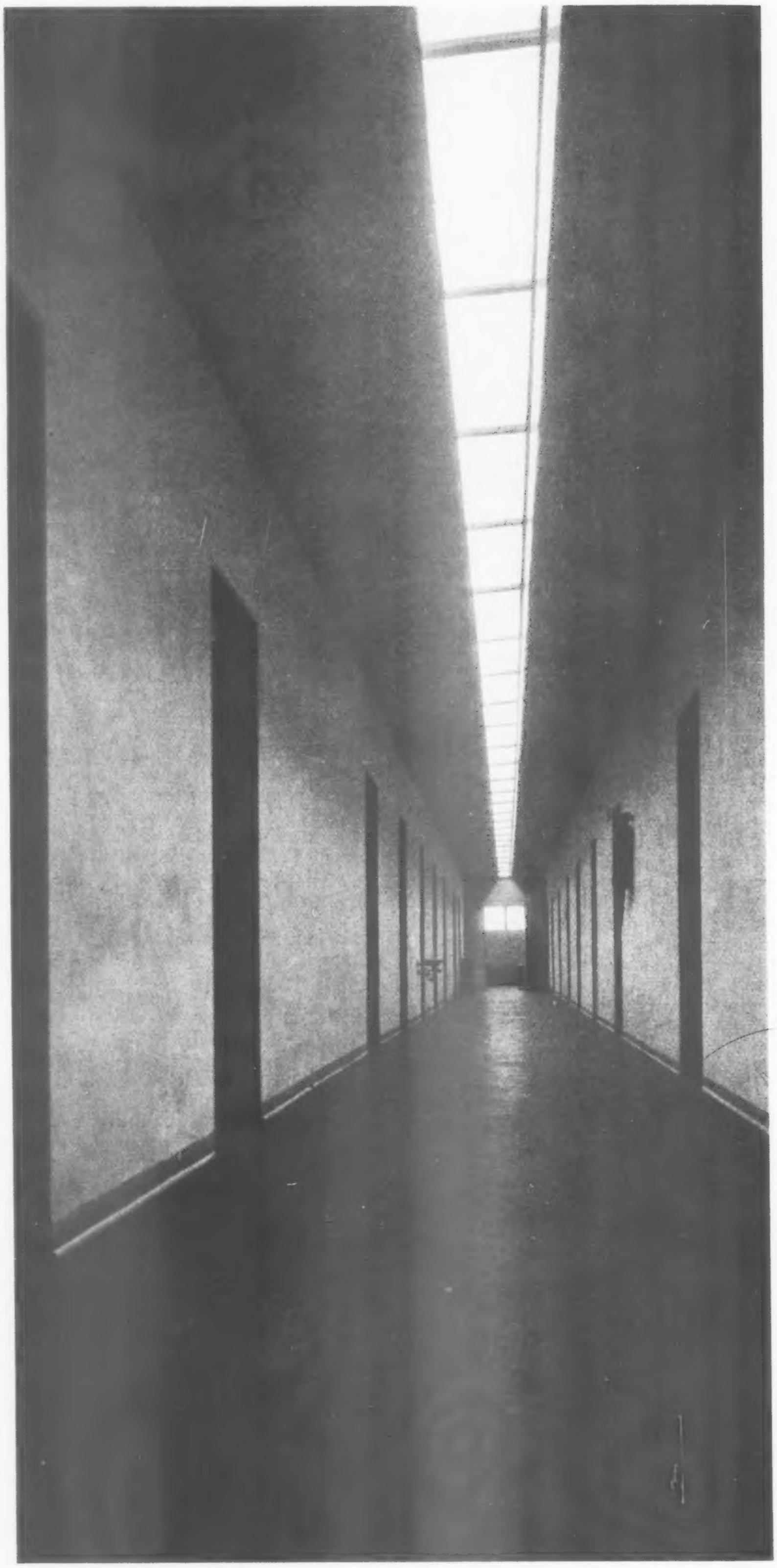
So far as can be ascertained manufacturers have not yet produced lamps of this type at a reasonable cost for school lighting, and until this is so more attention must be given to the setting of the filament lamps.

The "mainly direct" type of fitting is now considered the most desirable design for schools and this may take the form of a good opal globe, when a high degree of diffusion is obtained to eliminate glare and dense shadows, or any lamp fitting specially designed to direct lateral rays downwards. There are at present several good designs on the market of both these types of fitting, but a careful study should be made of all the requirements desired from the light before a choice is made.

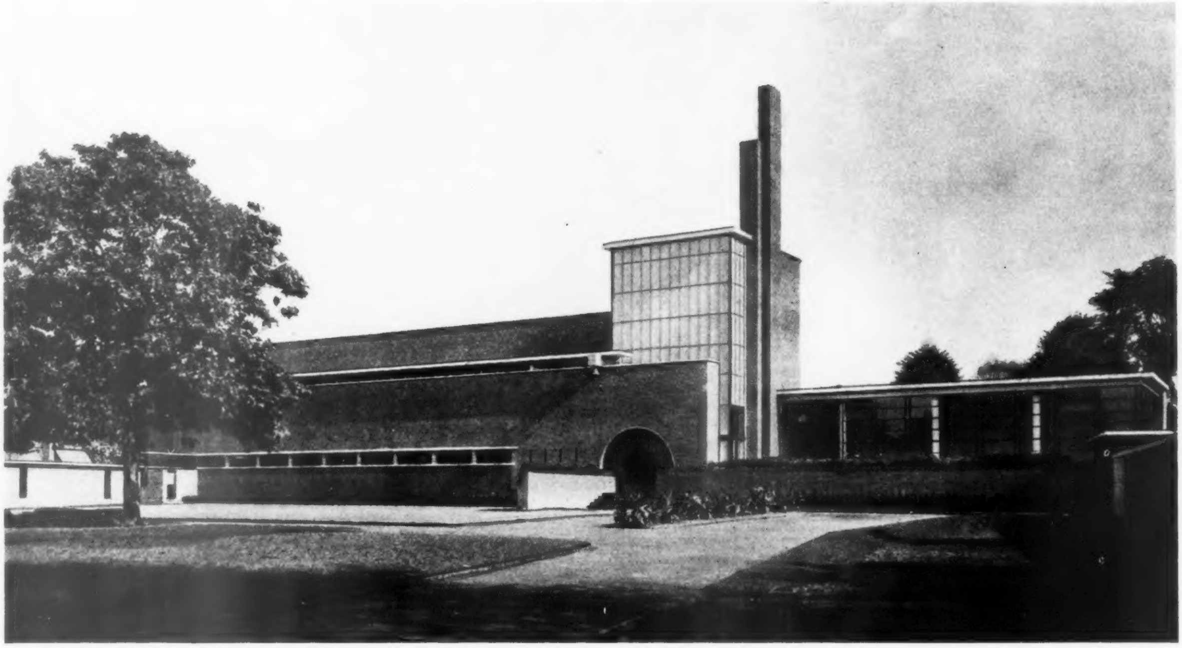
Heating and Ventilating

The heating, ventilation and lighting of schools has undoubtedly improved to a very great extent within the last 20 years and particularly during the last few years. There is still, however, a very great field for further improvement yet in present standards.

It is the duty of school managers and teachers, who are most closely associated with the working of schools, to discover where improvements can be made; it is the privilege of the architect to direct how these improvements should be carried out and it is to the material benefit of the manufacturers to make the improvements.



Internal corridor at the California Military Academy, with continuous cross-ventilated lantern light. Richard J. Neutra, architect.



Schullersweg School, Hilversum. By W. Dudok.

D: TECHNICAL

E Q U I P M E N T

PLANNING DATA

Derived from the Board of Education's Recommendations and other Publications

ENTRANCES

a : Must not lead directly into hall or other room.
b : Separate for each department and sex.
c : In large schools more than one entrance to each department desirable.
d : Entrance doors should open outwards.

STAIRCASES

a : Separate for each department and sex.
b : Adequate for fire escape purposes.
c : At least one external wall of fire-resisting materials.
d : Minimum width 4 ft. and not more than 14 steps to a flight. No quarter landings.
e : Treads 11 ins.–13 ins. Risers 5½ ins.–6 ins. No winders.
f : Illumination : 2–3 ft. candles.

CORRIDORS

For access purposes only.
6 ft.–8 ft. wide.

HALL

a : May be divided by sound-proof screens so that each half may be easily reached and used by different departments.
b : Must not be used as traffic hall to classrooms.
c : May be partly or completely detached from main building.
d : If used for exercises, singing or games, should be placed where work will not disturb classrooms.
e : A platform and chair store desirable. Platform, if large enough, can be used as occasional classroom, medical inspection room, or music practice rooms (each 8 ft. × 6 ft. 6 ins.)
f : Easy escape in case of fire or panic.
g : Cross ventilation.
h : Careful study of shape and materials for acoustical reasons.
i : Temperature 60 degrees.
j : Illumination, 7–9 ft. candles.
Elementary School : 3½–4 sq. ft. per head with maximum area of 1,500 sq. ft. Secondary School ; 6 sq. ft. per head.

GYMNASIUM

a : Windows opening to make room almost open air.
b : Wall bars and apparatus can be placed quite well over windows if provision for cleaning is made.
c : End walls should be solid.
d : Artificial lighting fixtures should be protected.
e : Floor hard wood boards 4 ins. wide on joists and laid across narrow width of room to give run along length of room without danger of slipping.
f : Changing-room about 350 sq. ft. with showers and footbaths.
g : Instruction room.
h : Apparatus room.
i : Apparatus for class of thirty will comprise :—
32 wall bars
2 double-span beams
4 wall ladders (2 adjustable)
4 rope ladders

A standard type of two-seater school desk with a flush top, locker, and I-section side members for stiffness. [Educational Supply Association.]

1 vertical window ladder (6 squares wide)
10 climbing ropes
5 tricing lines, 3 for ropes, 2 for rope ladders
1 vaulting box
1 vaulting horse
1 vaulting buck
2 jumping stands
2 beam saddles
6 benches
1 quilted mattress
1 beating board.

1 : Space between uprights of wall bars should be 2 ft. 8 ins.–2 ft. 10 ins.

2 : Benches should be strong, 11 ft.–12 ft. long and 12 ins. high and 10¼ ins. deep with hooks at one end.

3 : Vertical wall ladders are six squares wide and travel on vertical rods so as to stand 3 ft. 6 ins. from wall in use and lie against wall after use.

4 : Wall ladders in pairs, one of them adjustable.

5 : Vaulting horse—minimum height 3 ft. 3 ins. and adjustable up to 4 ft. 10 ins.

j : Temperature 55 degrees.

k : Illumination 11–13 ft. candles.

Class of 30 : Minimum 50 ft. × 25 ft., usually 60 ft. × 30 ft. Flat ceiling 16 ft. from floor.

DINING-ROOM

a : Hall or classrooms should never be used for meals owing to disturbance of arrangement and difficulty of keeping rooms clean.

b : Simple character—well ventilated—8 sq. ft. per head with 1 ft. 9 ins.–2 ft. per place at table. In any case a small dining-room should be provided in any school where the children bring their own lunches.

c : If lunches are prepared on premises, small well-ventilated kitchen with larder and usual stores. A kitchen of 200 sq. ft. will serve 100 meals per day. Separate service entrance will be required.

d : Lavatory, cloakroom and w.c. for kitchen staff will be necessary.

e : Temperature 60–65 degrees.

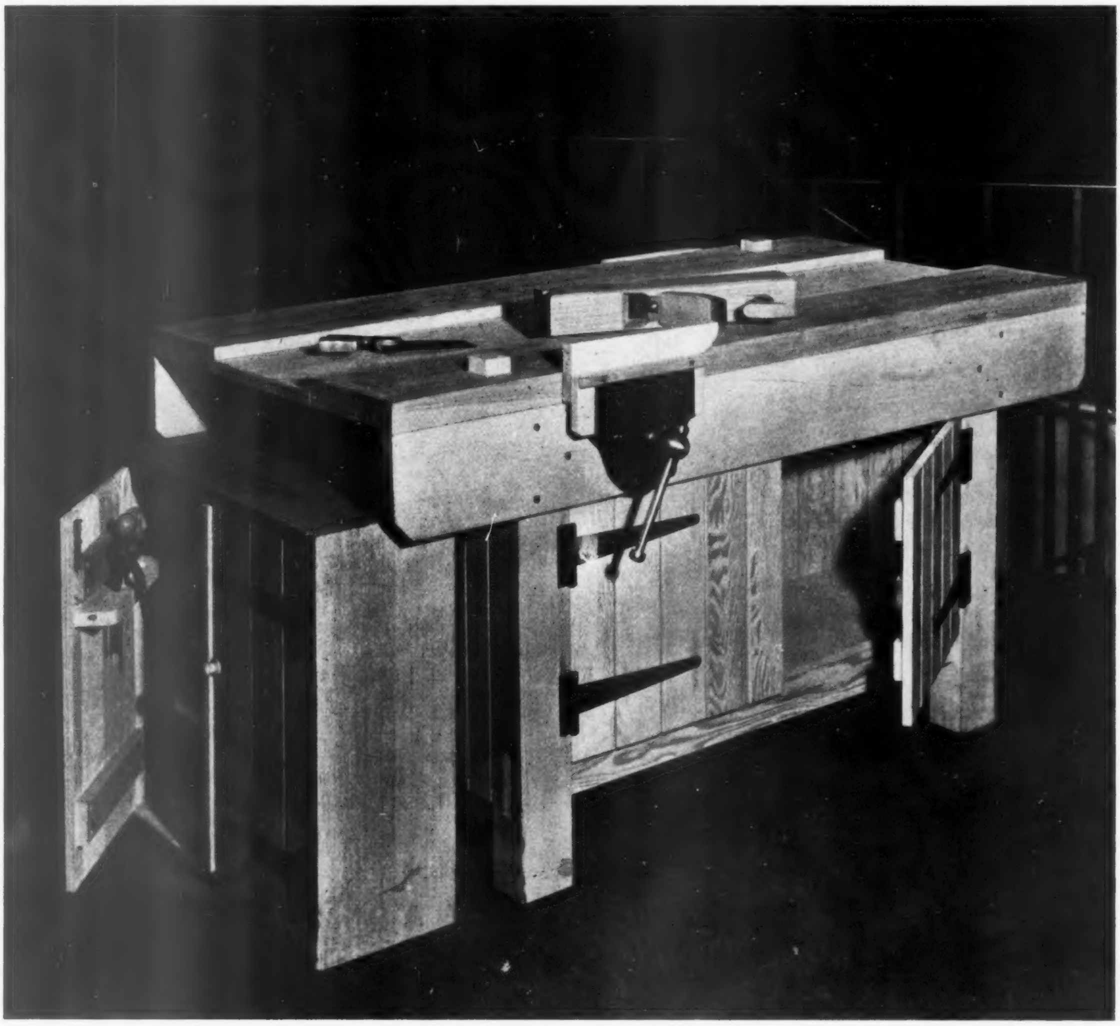
f : Illumination 7–9 ft. candles.

LIBRARY

a : Should not be combined with other rooms as this limits use.

b : Open access system with easy supervision by librarian.

c : Sections for reference and light reading.



A dual woodworking bench with a pair of instantaneous vices and a tool cupboard. The cupboard at the end is a separate fitting and may be used as an alternative to the built-in fitting. [*Educational Supply Association.*]

d : Use as general reading-room, with fitted bookshelves and movable tables and chairs.

e : Librarian's table with index files.

Allow 35-40 sq. ft. per head plus, say, 150 sq. ft. for individual students. If number of students in school exceed 460-490 or 620-660 provide library of 1,200 sq. ft., with annexe of 600 sq. ft. for additional seating, reading and periodicals. Table with readers both sides 3 ft. 6 ins. wide, with chairs projecting 1 ft. 9 ins. Standard depth of stack 1 ft. 8 ins., with 4 ins. projection each side for lower portion. Allow 1 ft. room for 9 volumes.

CLASSROOMS

a : There must never be more than one teacher per classroom.

b : Must not be passage rooms from one part of the building to another, or from inside to outside.

c : A clear space 7 ft. 6 ins. in depth for the teacher. 6 ins. dais may be used.

d : 1 ft. space behind back row seats.

e : Gangway of not less than 1 ft. 4 ins. on one side of each child.

f : In small schools taking pupils of widely different ages classrooms of longer shape than usual called Main Rooms are used to allow one teacher to take several groups.

g : Last vertical line of glass furthest from teacher should line with back of the last row of desks.

h : Where windows are provided in one wall only this must be on scholars' left.

i : No windows should face teacher or scholars, and any additional windows should be on scholars' right, but not shedding stronger light than windows on left.

j : Skylights only approved in special circumstances.

k : No desk shall be more than 20 ft. from a window.

l : No window cill higher than 3 ft. 6 ins.

m : Upper panels of doors should be glazed to facilitate supervision.

n : Floor should be level, though 6 ins. dais for teacher may be used.

o : Classes in Elementary Schools consist nominally of 40 pupils; in Secondary Schools, 30 pupils.

p : Clear view of blackboard, which should be matt surfaced.

q : Temperature, 60–65 degrees.

r : Illumination, 7–9 ft. candles.

Minimum height, 12 ft. to flat ceiling. If ceiled at collar beam, 10 ft. to wall plate and 13 ft. to ceiling, which must extend at least half the area of the room. Exception to height rule: Rooms with adequate cross ventilation may be 1 ft. less in height. Area of glass not less than one-fifth floor space.

Elementary Schools

10 sq. ft. per child under 11 years of age.
12 ,, ,, over ,, ,,
Space for desk and seat, 2 ft. 5 ins. × 1 ft. 9 ins.

Secondary Schools

16 sq. ft. per child.
Space for desk and seat, 2 ft. 9 ins. × 2 ft.
If tables or dual desks are used, 20 ins. per older scholar, 18 ins. per younger must be allowed.

HANDICRAFT

a : Treat as workshop. Separate building preferred for reason of fire and noise.
b : Flat ceiling not necessary.
c : Floor should be of a nature not to damage tools dropped on it.
d : Ample storage for tools and work in progress and timber.
e : Skylight on north side can be used to improve the light if desirable.
f : Provision for metal work sometimes required with a forge and fireproof floor in an extension.
g : Space for benches for mechanical drawing an advantage.
h : If machine shop is required, 1,000 sq. ft. should be regarded as minimum.
i : Open roof for storage of timber.
j : Blackboard necessary.
k : Tools rack for each bench.
l : Illumination, 11–13 ft. candles.

Height at windows, 9 ft. Twenty scholars would require 600 sq. ft. Benches, 4 ft. 6 ins.–5 ft. Space at least 2 ft. 6 ins. between benches.

DOMESTIC SCIENCE ROOMS

Cooking

a : North aspect desirable. Provision for ventilation, and placed so that smells do not interfere with the rest of the school.
b : Larder facing north-east.
c : As many of the alternative cooking fittings as can be afforded.
1 : Coal range with back boiler and cylinder.
2 : Oil stove (in country districts).
3 : Closed cooker of Aga or Esse type.
4 : Gas cooker with vent flue.
5 : Electric cooker.
6 : Hot plate.
7 : One sink, 3 ft. long, with draining-boards and Hot and Cold placed for demonstration purposes.
8 : Movable tables, 2 ft. 6 ins. high, allowing 2 ft. per scholar; seats to be provided.
9 : Ample storage and racks for crockery, utensils, and dry stores.
10 : Floor should be easily washable and warm to the feet.
11 : It is a convenience if there are desks and blackboard arranged for theoretical instruction.
12 : In large schools a second room for needlework is sometimes required.
13 : Walls should be washable and tiled behind sinks.
14 : Shelves for reference books.
15 : At least two enclosed cupboards in addition to stores.
d : Illumination, 7–9 ft. candles.

Eighteen pupils, allowing 25 sq. ft. per head. Additional allowance of 5 sq. ft. per head for fixed apparatus. Minimum total area, 600 sq. ft.

Laundry

a : Stove for heating irons. Allow 2 irons per pupil. Plugs for electric irons.
b : Copper holding 12–18 gallons with supply and draw-off cock. Gas or electric boilers should be provided if possible.
c : Two sinks not less than 3 ft. long with draining-boards. Taps high enough to allow buckets to be filled.

Lavatory accommodation in a Viennese kindergarten. Combs, toothbrushes and glasses in separate racks, each with a distinguishing mark. Franz Singer, architect.

Sliding and folding windows with centre hung lights above and hoppers below. Manston School, Nottingham.

A dual cookery table with cupboards and a white stove-enamelled steel top. [Educational Supply Association.]

Varying types of school windows. Butler, Jackson & Edmonds, Architects.

Drawers in a nursery school for use by the children. Books, coloured cards and other suitable materials are put away by the children. Franz Singer, Architect.

d : Slop sink 12 ins. deep.
e : Aggregate table space 6 sq. ft. per scholar, and convenient width for table is 2 ft. 6 ins.
f : Ample storage.
g : Drying cupboard.
h : Adequate ventilation.

A large room suitable for instruction in cookery and laundry work would be suitable for teaching combined domestic subjects, with the addition of at least two adjoining rooms approximately 14 ft. × 12 ft., furnished as sitting-room and bedroom respectively.

Eighteen pupils, allowing 25 sq. ft. per head. Additional allowance of 5 sq. ft. per head for fixed apparatus.

ART ROOM

a : North light essential with sill 5 ft. above floor.
b : 2-in.–3-in. wood rails along walls for hanging drawings.
c : Shelves for casts, etc.
d : Store rooms with shelves.
e : Sink and draining board.
f : Blackboard of material to take drawing pins.

30 sq. ft. per head.

SCIENCE

Laboratories. General Arrangement.

a : Benches at right-angles to light.
b : Demonstration table 10 ft.–12 ft. long, 2 ft. wide, on raised platform, with gas, water, electric power and fume closet with flue. Large blackboard. These can be in lecture room if provided.
c : Stools to push under benches so that room will also serve for theoretical instruction and note taking.
d : Instructor's preparation room 10 ft. wide, running full width of laboratory.
e : Three wooden suspension beams, 7 ins.–9 ins. in section, at right-angles to roof principals with longer side vertical. Minimum spacing 12 ft., running whole length of room.
f : Illumination 11–13 ft. candles.

20–30 sq. ft. per head.

Chemistry.

a : Benches 2 ft. 9 ins. high and 2 ft. 3 ins. deep, single, 4 ft.–4 ft. 6 ins. double, with drawers.
b : Sink in bench shared by two to four students.
c : Gas burner for each student.
d : Wall shelves for balances, and other apparatus such as fume cupboards, supplied with gas 3 ft. × 2 ft., and 4 ft. × 2 ft. 3 ins. for advanced work.
e : As large a wall space as possible should be left as working space. On one side sills should be kept 8 ft. above floor, provided cross ventilation is adequate.
f : Glass shelves on benches for reagents.
g : Special provision for drainage with easy access.

Physics.

a : Stout tables instead of benches, 6 ft. × 2 ft.
b : Provision for darkening room.
c : Adequate number of electric light plugs.
d : Gas supply.
e : Sinks.

Botany.

a : Same size as ordinary laboratory.
b : Some south windows for sunlight to secure germination of seeds.
c : Small greenhouse.
d : 2 ft. wide bench under windows for work requiring very good light.
e : Tables giving 3 ft.–3 ft. 6 ins. run per pupil, 2 ft. 3 ins. deep.
f : Two sinks in convenient position.
g : Storage for tools, microscopes, etc.

Lecture Room

a : Demonstration table 2 ft. 6 ins.–3 ft. wide with sink having flush movable top. At least 5 ft. space between table and front seats.
b : Rising tiers of seats 2 ft. 9 ins. wide, rising 7 ins. Allow 1 ft. 10 ins. per head. Adequate gangways.
c : Long and movable blackboard.
d : Light-excluding blinds over windows facing lecturer.
e : Screen and provision for lantern.
f : Suspension beams as science (*e*) 6 ft. long, 8 ft. apart, running across demonstration bench.

12–14 sq. ft. per head.

INFANTS' ROOM

a : Separate room from older children.
b : Always on ground floor.
c : Easy access to playground and offices.
d : Ample blackboard space within easy reach of children.
e : Space for exercise indoors which can also be a playroom. Light movable furniture.
f : Temperature 60 degrees.
g : Illumination 4–6 ft. candles.

12 sq. ft. per head.

TEACHERS' ROOMS

a : Separate room with private lavatory for Head Teacher.
b : Small waiting-room and secretary's room, of ample size.
c : Separate Common Room for each sex, of ample size.
d : Separate lavatories and cloakrooms for each sex.

A staff of	3–4	requires	2 basins and	1 w.c.
,,	6–10	,,	3	,,	2 w.c.s
,,	10–15	,,	4	,,	3 ,,

MEDICAL INSPECTION

a : Inspection Room must have space in one direction of 20 ft. for eye testing.
b : Sink with H. & C. ; at low level if can be used as foot-bath.
c : Small waiting-room with lavatory and w.c., in duplicate if possible for staff and patients.
d : As it will only be used for short periods the room can be conveniently used for other purposes as well, e.g. secretary's room.
e : If a Dental Room is required it must be used exclusively for this purpose and should have good light (north for preference) and sink.
f : Elaborate examination and treatment are generally given at special clinics.

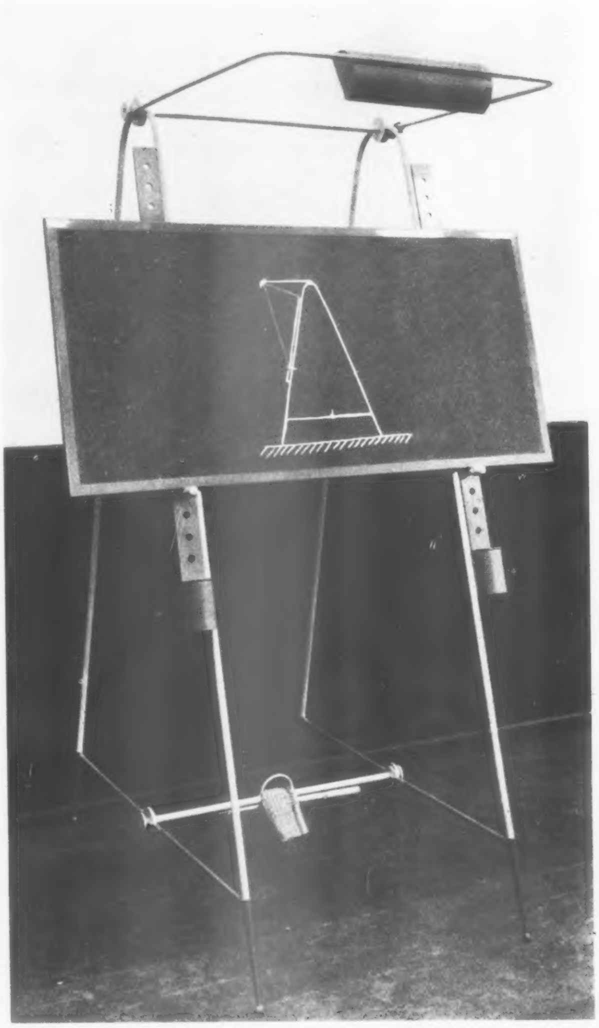
Minimum area 150 sq. ft.

CLOAKROOMS

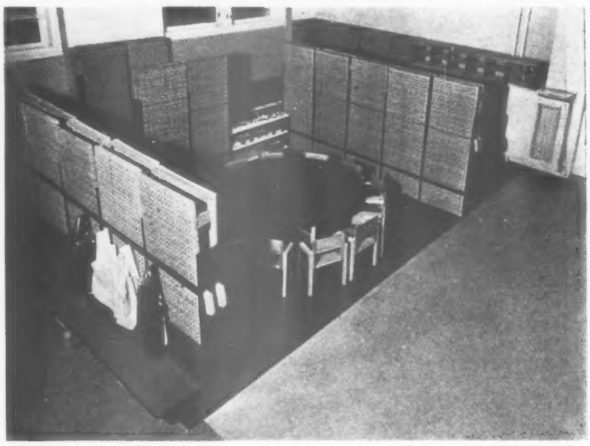
a : Separate for each sex.
b : Cloak-rooms must be distinct from passages and class-rooms.
c : Close to entrance.
d : Easy circulation essential.
e : Ample space outside cloakrooms.
f : Through ventilation.
g : Gangways at least 4 ft. between hanging rails.
h : Hat pegs staggered in not more than two tiers, pegs on same tier 12 ins. apart for boys, 18 ins. apart for girls and infants.
i : Door or gates which can be locked if necessary.
j : Cloakrooms should be warmed, with, if possible, arrangements for drying wet clothes.
k : Floors impervious to damp.
l : Temperature 55 degrees.

LAVATORIES

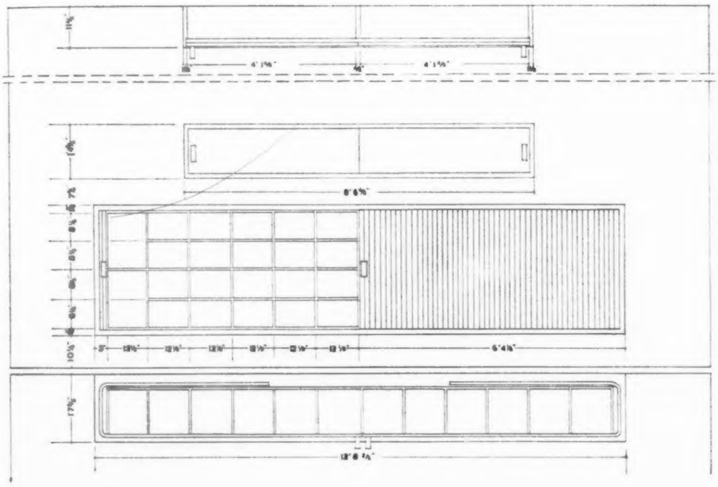
a : Separate for each sex.
b : Cut off from passages and classrooms.

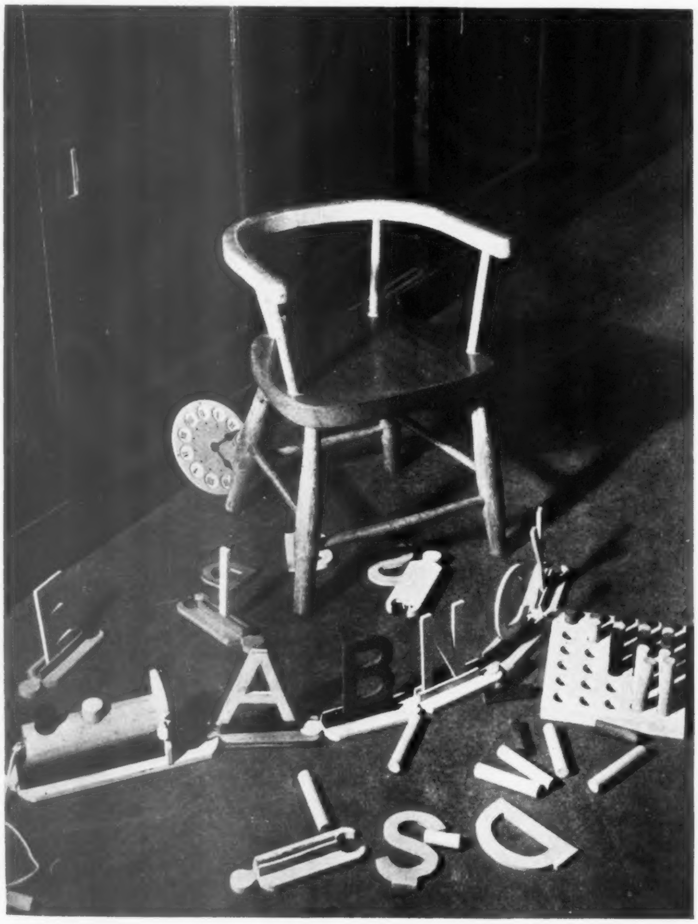


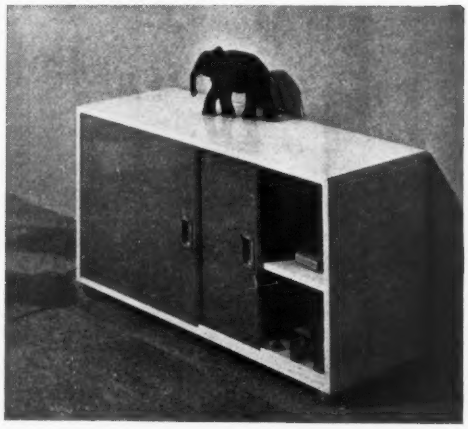
An illuminated easel in steel tube : the design, although light, has proved satisfactory in actual practice. Designer : R. O. Sutherland.



Day-beds in woven leather on a wood frame folded up when not in use. Franz Singer, Architect.







Various types of infant school furniture. Top, a classroom cupboard from Villejuif; below, left, a child's chair and toys, Educational Supply Association. In the right-hand column are two standardized furniture units by Paul and Marjorie Abbatt.

A general display of nursery school furniture : cupboard units, small tables and chairs, cookery cabinets, and, on the right, a slide and steps. Paul and Marjorie Abbatt.

c : Close to entrance.
d : Easy circulation essential.
e : Ample space outside.
f : Through ventilation.
g : Floors impervious to damp.
h : Two basins for every 50 children (Elementary School). Six basins per 100 and 4 for each succeeding 100 (Secondary School).
i : Supply of drinking water.
j : Towel store.
k : *Temperature 55 Degrees.*

CLOSETS AND URINALS

a : Closets, except for teachers' use, should be completely disconnected from the school.
b : Entirely separate for each sex. (Not for infants.)
c : If entrance is screened there should be entrance at each end of screen.
d : Each closet must be 2 ft. 3 ins.– 2ft. 10 ins. wide, fully lighted and ventilated, with door 3 ins. short at bottom and at least 6 ins. short at top.
e : Urinals should be in proportion of 10 ft. to 100 boys and be divided off from closets (Elementary School).
f : Table showing number of closets needed in Elementary Schools :—

	Girls	Boys (in addition to urinals)
Under 30 children	3	1
,, 50 ,, ...	4	2
,, 70 ,, ...	5	2
,, 100 ,, ...	6	3
,, 150 ,, ...	8	3
,, 200 ,, ...	10	4
,, 300 ,, ...	14	5
,, 400 ,, ...	18	6

g : In Secondary Schools accommodation required is :—
Boys : Four w.c.s for first 100 and 3 for each succeeding 100. Six urinal stalls for first 100 and 5 for each succeeding 100. Separate stalls.
Girls : Six closets for first 100 and 4 for each succeeding 100.

BATHS

a : Showers or spray baths of simple kind may be fitted where there are few facilities for cleansing children elsewhere and these will be accepted in substitution for portion of lavatory accommodation usually required.
b : 12–20 children should be able to bath at one time.
c : Simple dressing boxes or partition spaces.
d : Drying chamber and towel store.

CARETAKER

a : Adequate storage space.
b : Slop sink and draw-off cock.
c : Good-sized intake room for meters, etc.
d : Basin and w.c.

HEATING CHAMBER

a : Proper ventilation.
b : Fuel store easily accessible.

STORES, ETC.

a : Storage space should be treated as part of the structure and should be naturally lit, and will be required for :—
1 : Stationery.
2 : Maps adjoining geography room.
3 : Apparatus and Preparation Room in conjunction with Science Rooms.
4 : Games and gymnastic apparatus.
5 : Lantern.
6 : Meteorological instruments,
and as scheduled under respective headings.

E: FORECAST

THE SCHOOL OF THE FUTURE

By Dr. WILLIAM BOYD
Glasgow University

WHAT kind of world will there be in 1950, when the boys and girls of to-day are entering on young manhood and womanhood? Or in 1970, when according to the statisticians there are to be comparatively few children and many old folks? Nobody knows, nobody can tell. But the education of the future depends on the world of the future, and any forecast of educational developments must be made on a guess regarding the course of events.

We can begin with some IF's. If no way is found out of the international muddle, and there is constant danger of war, if not actual war, there is going to be a great wastage of economic resources, and a chronic condition of trade crises—and no money available for proper school buildings and equipment, or for adequate teachers' salaries. IF mankind does not learn soon how to solve the problem of the distribution of wealth, there will be a steady diminution of population, chronic unemployment and nothing worth educating men and women for. IF the world's distresses bring about an increase of dictatorial government, schools will be devoted to the production of a race of helots instead of finely developed human beings, and education will be subordinate to politics.

Assuming, however, that mankind weathers the storms of crises by processes of adjustment beyond present calculation, as we hope and pray, there are two guiding lines for the educational prophet. Looking backwards on the education of the past, he notes the inherent conservatism of the school tradition. School ways change slowly at the best, and even revolutions are apt to pass them by and leave them carrying on much as they always have done. It is three hundred years since Latin was a living medium of educated expression, but the artistic and intellectual pursuits of the modern world still count for much less in the schools of to-day than this dead language. Whatever changes are coming in our own immediate future are going to come slowly, even if other social changes come quickly.

But looking around at the changes, which, despite this conservatism, are on the way, the prophet notes a marked change in mental attitude on the part of parents and teachers, which makes him speak hopefully of a "new" education. He is conscious of people all over the world striving after a different kind of life for themselves and a different kind of education for their children. Here, then, are two contrary tendencies on which the attempt to look into the future of the schools must reckon. The prophet must make his choice as to whether he is going to stress the forces making for the old ways or those making for progress.

Being an optimist, my own faith is in progress, for two reasons. The one is that big social upsets, if they are not big enough to overwhelm, lead people and nations to venture on educational experiments of far reaching character. Witness the Education Acts of 1918 in this country, the rise of new schools of many types in Germany just after the war, the gigantic educational ventures of Soviet Russia. The other is that the twentieth century has shown mankind everywhere willing and tolerably able to make quick changes without parallel in the past. The idea of a planning of social life on the basis of scientific thinking holds out possibilities of changes which sooner or later are going to reach the conservative calm of the schools.

The point to be observed is that already the changes are under way. The art of the prophet is to discern their direction and estimate their extent.

New Methods

The most obvious change to anyone who can compare 1900 with 1936 is the change that has come about and is still coming in the sphere of school *methods.* When Professor John Dewey in the closing years of the last century set himself to create a new kind of school with learning based on occupations, he came up against the fact that classrooms and school furnishings were all designed for passive scholars. He simply could not get the makers of school equipment to understand what he wanted. He had to alter the character of the school without the help of the ordinary teachers or of those who catered for their needs. He wanted a place where children could move about freely and behave like the active young animals they were. In point of fact, the schools of to-day, in spite of him and the growing company of idealists, are still based on the class system. There has come a gradual reduction in the size of the learning group, but children of all levels of mental power are still massed together on an age basis, and the thinking they do is still too often done in herd fashion, under the control of teachers whom the circumstances of their work as much as their own limitations lead to think of pupils as members of a type and not as distinctive beings. The best that can be said about most existing schools is that they are gradually coming to displace the fixed desk, which is the symbol of static learning, in favour of the movable table which allows personal work, and that there is more floor space available and more willingness to let the space be used for free activities.

Nevertheless, the direction of change in the matter of methods is clear and definite. It is indicated by the stress

A school which has had great influence in Scandinavia. The Katarina Nya Realskola at Stockholm.

on occupations which Dewey emphasised. The old slogan about learning by doing, which has always been more honoured in lectures about education than in the schools, has taken on a new meaning with the realization that it is by doing things that call forth mental interest and activity that school work becomes alive. The new point of view is a break away from the preoccupation with subjects to be learned because grown ups think in the subject kind of way, and their conversion into projects or tasks that mean something personal for the children. Instead of routine drill in arithmetical examples or music scales or Latin declensions, the understanding teacher gives the pupils jobs that bring in counting, tunes that involve scales, stories in the foreign tongue that require grammatical knowledge.

With this notion of worth-while occupations for the scholars, go two very important ideas. The one is that most of the things that have to be learned *have to be learned individually*. That truth has been most firmly grasped in the instruction of the youngest scholars. Dr. Montessori has put the matter in challenging fashion in her own special method. In it the children busy themselves with apparatus that is devised to carry on learning through an orderly succession of stages. But it is for the child to decide whether he wants to concern himself with the lesson suggested for him. If he does not want to learn anything, says she in effect, it is either because he is not yet ready for it, or because he has got beyond it, and has no interest in it. In either case it is futile to insist on his occupying himself with it.

Actually, the idea has very wide application at all ages. You can take the horse to the water, but you cannot make him drink. There can be no real learning unless the child wants to learn, and the child is not going to want to learn unless what is put before him is appropriate to his mental years and his emotional needs. A very disturbing doctrine this for the teacher with fifty children in front of her! Here are pupils with all degrees of arithmetical ability or reading power, and even if the examiner or inspector is going to come along one fine day expecting to find them all up to a prescribed mark, the differences are there first, last, and all the time. What is to be done about it? Reward or punish? Labour to make the dull understand and leave the bright fellows to look after themselves? Oh no, nothing will avail so long as these children are treated as herd learners. The class must somehow or other be resolved into its units, and a method be found to let each pupil move on at his own pace. Impossible, says the class teacher, and the headmaster, and the inspector. Well, education is impossible. The old education certainly. The moral is plain to be seen, and prophecy easy. As soon as we really want to educate, we must find ways and means by which the individual can remain an individual. It can be done. It is being done. It will be done universally one day. What? No classes. Well, hardly that. There is a place for class work in some subjects, and possibly some place for class work in all subjects. People do learn better together, if not to the word of command.

The second idea that follows from making occupations the centre of school interest is that good work must always be personal, and not made to somebody else's pattern. The rabbit hutch a boy constructs is most satisfying when he puts his own planning into it, and decorates it, if it seems good to him to do so, with his own art. The composition he writes is most vivid when he talks about something that really matters, and does so without too much need to conform to external requirements regarding script or grammar. If there are books to be studied, some measure of choice according to liking raises the quality of the learning.

If this is true in regard to everyday activities it is doubly true in the domain of art and the fine things of life. Cizek in Vienna made the happy discovery that the boys who came to him to learn to draw, developed unique personal powers as artists, if he kept out of the road and left them to draw on their own, with only the help they asked when they discovered their need for it. Caldwell Cook in Cambridge, and Hughes Mearns in New York, have inspired boys and girls to write real poetry by expecting them to be themselves in creative endeavour. Not imitation, but creation, is the watchword of this new teaching that sets free the deep powers of childhood and youth. Behind this again is another truth: that the way to understand the masterworks in art, literature and music is not through a passive appreciation that assumes impotence and incapacity on the part of the learner, but in the personal practice of the arts that brings the learner into the same universe of insight as the great masters.

New Studies

New methods then are the first signs of forward reaching change in the schools. People accept the ordinary studies and seek for betterness in more

TOTAL PUBLIC EXPENDITURE* ON EDUCATION (ENGLAND & WALES).

	From Exchequer and Rates. £	Per Head of Population. (000's omitted)	Per cent. from Exchequer.
1914	31,310	17.1	48.9
1920	56,085	31.8	56.8
1925	74,595	38.6	58.2
1930	83,050	41.11	54.3
1931	86,469	43.5	54.9
1932	85,650	42.10	55.7
1933	83,605	41.7	53.4

* Financial responsibility for State education is divided between the Government and the L.E.A.s and varies from year to year and from one authority to another. For elementary schools it is an intricate calculation based on a block grant of 36s. for each unit of average attendance; 60 per cent. of the expenditure on teachers' salaries; 50 per cent. of the expenditure on special services; 50 per cent. of the expenditure on maintenance allowances; 20 per cent. of the remaining net expenditure; less the product of a 7d. rate. During the crisis the grants were formidably reduced, but have been restored since July, 1935.

PUBLIC ELEMENTARY SCHOOLS MAINTAINED BY LOCAL EDUCATION AUTHORITIES (ENGLAND AND WALES).

	No. of Departments.*	Schools.
1913	32,300	—
1920	32,145	—
1925	31,001	—
1930	30,429	20,803
1931	30,363	20,867
1932	30,226	20,898
1933	29,959	20,874
1934	29,701	20,842

* Under separate head-teacher—may be two or three departments per school.

" Real learning requires the personal response, which only comes when the learner is tackling something that has value for him on his own level of experience."

" These people (masters and mistresses) are not to be ' bosses,' but guides and helpers . . ." Both photographs are of Franz Singer's nursery school in Vienna.

vital ways of learning and teaching. But it is not long before it becomes evident to the critically minded that the trouble goes deeper. It is not simply a matter of wrong method, but quite as much a matter of wrong *studies*. Schooling is so often a disappointing business because the boys and girls are learning what is not worth learning. Worth learning for whom, it may be asked ?

The first answer must be : *not worth while for the boys and girls*. And instantly the voice of the protesting old educator is raised in objection. How can children know what is worth while or not worth while for them ? Is that not a question for the wiser and more experienced elders, parents, teachers, grown-up community ? There is, of course, a large measure of truth in this view. Grown-up people have the chance of knowing best, and are under obligation to determine the course that learning is to follow, so as to ensure the children being fitted for their social future. But this needs qualification. Even when it is decided that certain skills and knowledges are essential, the children's interest needs to be taken into account. Real learning requires the personal response, which only comes when the learner is tackling something that has value for him on his own level of experience. Actually, the question here is not one of what is to be learned, but how. The competent teacher can get his pupils to want to learn anything that he wants them to learn, within the limits of their competence.

The second and more important answer is : *not worth while for life*. It sounds nonsensical to suggest that anybody should want to teach what is not of practical value, but the plain fact is that a great deal of what is taught in schools is learned only to be forgotten, and passes into the limbo of the past without much effect on the pupil. Think of the time devoted to teaching children to read, write and count without a thought being given to the use that is to be made of the acquired skill, and without the discovery that a great deal of subjects like much of school arithmetic, for example, is of no use to anybody. But the unreality of the school learning is most patent and most tragic in the upper reaches of the school. Here the precious years of adolescence are given over to learning languages which most pupils will never in later life read or speak or use in any way, and to mathematics and sciences which for the most part do not link up with ordinary life.

The new education that is on the way will hew down a great deal of this lumber of the past, and put in its place living studies that are fit for the world of to-day. Art, music and drama, but poorly and slightly represented in our examination-ridden programmes, will play a larger part in the school world, and foster interests likely to pass on

"The class must somehow or other be resolved into its units, and a method be found to allow each pupil to move on at his own pace."

into young manhood and womanhood when the problem of leisure time becomes urgent with increasing freedom. Science, now largely limited to the abstractions of physics and chemistry, will be broadened out to give acquaintance with the phenomena of life and mind, and to illuminate the mechanisms on which an industrial civilization depends. But biggest change of all will be in the emphasis on the social studies—history, economics, politics—which are the fundamentals of good citizenship in all its aspects.

New School Communities

New studies, then, are the second plank in the scheme of educational reconstruction: studies that will equip the young people for the life of to-day and to-morrow, and tune their minds to realities. But even that is not the full tale. More significant than new methods and new studies are *new human relationships*. On the last analysis the most important thing is not what a man knows and can do, but what kind of man he is, his character, his social personality, himself when he is most himself. On this side, the school as we know it has been disappointingly poor. Boys and girls are but ghosts of their best selves in the classroom. Their lives are determined for them by other people, and the other people are apt to be dominating people who provoke reactions which are either anti- or non-social reactions. Here, as we have been discovering in our study of problem children, are the roots of the conflicts that issue in the clashes of classes and nations and races. For compensation, the young people have turned to games and recreations in which they can be personal and social at once and have found community of interests outside the school instead of inside. They work at their games instead of playing at their work.

Instead of thinking of lessons as tasks to be performed under external controls in preparation for a later period of life, we have to see in the school a training ground for the community life; and that it can only be, if it is itself a real community in which the youthful citizens have a very large share in determining their own lives. The old idea of teachers as "masters" and "mistresses"—superior, dominating people who impose law and order by their fiat—must go the same way as the fixed class system and the study of languages and sciences which are mere instruments for future use. It is not through obedience to others that men and women learn to direct their lives, but through opportunities to co-operate with their peers and to hold their own in a society of free persons. The school of the future will be a commonwealth of childhood, not a barracks where children are cajoled and coerced into doing what their elders want them to do. That does not mean that there will be no place in it for teaching and control on the part of older and wiser people, but it does mean that these people are not to be "bosses," but guides and helpers, skilled in impersonal organization and capable of inspiring the sustained effort that is necessary to keep pupil self-government on a reasonable level of efficiency and spiritual power.

The School of the Future Brought Down to Earth

All that has been said about the new education will probably sound to practically-minded people very much up in the air. Ideals, even when they are on the road to realization, always do. Let me in conclusion try to bring it down to earth by setting forth my picture of the school of the future as I would have the architect plan it and the builder build it. It will not be big in numbers: three or four hundred scholars perhaps, certainly not more than five hundred: all ages and both sexes, preferably with a mixing of social classes. Out in the country, of course, with plenty of space around it for games and gardens and free movement, not too firmly marked off from its neighbourhood by barrier walls that shut in and shut out. I envisage one big central building with a fine auditorium of the American type for daily assemblies of every kind, to serve as a focus of the school community life: with learning rooms for active work at benches and tables, provided with ample blackboards and reference books, well supplied with relevant charts and pictures constantly being changed; with a tempting library hall under expert guidance in regular use, with facilities for personal browsing as well as for real research on the problems raised in the learning rooms; with spacious corridors, made alive with display cases to illustrate lessons and exhibit the most interesting work done by the pupils; with specially fitted rooms for the administrative officers and for the medical and psychological guides. Round about, a number of smaller units—craft rooms, studios, museum, gymnasia, open air theatres, with odd buildings for special purposes which the pupils might be encouraged to plan and build for themselves.

No, this is not Utopian. We build schools approximating to this for the upper classes now. In the days to come, when we have realized better than we yet do that the school is the power house of the community we will build such schools for all the children of all the people. Nothing is too good for the children.

F: THE FUTURE

THE SCHOOL AND SOCIAL DEVELOPMENT

A SUMMARY

BY HUGH QUIGLEY

IT has not been customary in this country to associate planning with the location and construction of schools, and sometimes one may have a feeling that our educational policy is perhaps the best illustration of the national capacity to avoid difficult issues and to leave progress to a kind of unnatural evolution which may have some of the attributes of wisdom, but wisdom of a type which would be fully intelligible only to Alice in Wonderland.

Slowly, however, as a result of a revolt from within, a new attitude is being defined which may in time lead to a keener appreciation of the need for intelligent forecasting and intelligent adaptation. The educational world has always been permeated by theories, some of them held by idealists with no full knowledge of the practical requirements necessary to the successful realization of all ideals, but more often by men who have a large experience of education and desire to use that experience in further and more valuable service to the community.

It is difficult for the theorist in education to be in the final analysis impractical, because in no other phase of constructive human thinking does progress overtake so rapidly ideal and vision. There is less danger of an extreme view being impractical or dangerous in education than in almost anything else, but unwillingness to recognize this fact has led to wasteful fumbling and indecision.

Elsewhere in this number, some of our most intelligent and forward-looking educationists have explained what they consider necessary to a full education. In this they may not have advanced very much farther than Montaigne and the eighteenth-century Italian theorists, since the knowledge of a full life is one which touches on realities apparent to every age. But what they have done is to emphasize and simplify at the same time.

Educational Problems

The educational problem is not really a difficult one, granted decision, courage and generosity. It becomes extremely complicated if an attempt is made to identify the second best, the cheap solution and the cowardly evasion with an effective educational policy. The attempt to save a few thousand pounds in the building of schools may lead to much ingenuity in school construction, but if the result of this ingenuity is merely an inadequate and unsatisfactory structure, the saving is certainly not worth while. The construction and planning of schools bear all the marks of this attempt to economize and save money which should not be saved. An annual budget of about £3 million for the construction of new schools and the reconditioning of school accommodation in a country as rich as Great Britain appears to be both farcical and humiliating.

Basic Factors

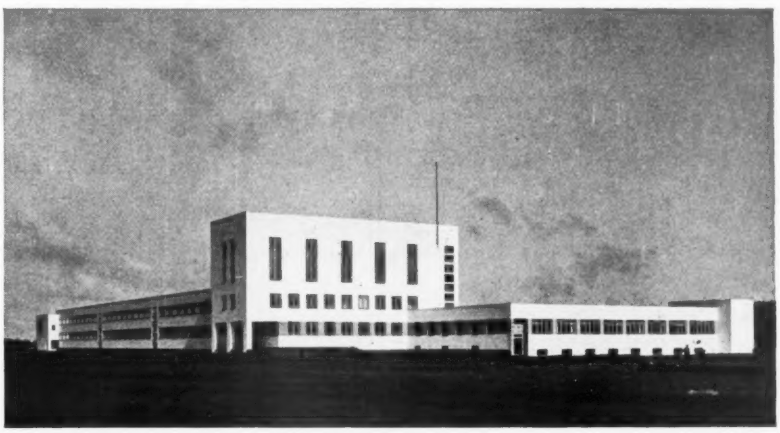
The school population is declining, if we are to believe our experts on population. The average age of the nation is bound to increase in the future and so the easy argument runs: Why should we trouble about additional or new school accommodation if there must be less school population? The answer to this argument is simple and on the whole unnecessary, since the thesis refutes itself, but there are some considerations which should be stated:

1. It is not proved yet that the school population will decline over a long period of years. Birth rates and death rates, affected by such things as trade cycles, may move in a direction contrary to what the prophets indicate. With increasing prosperity, the birth rate almost automatically rises. The onset of a great war in the near future may disturb fundamentally the balance of population. The repopulation of the countryside and the movement of population generally may cause a shift in the incidence of educational requirements.

2. What is the proper definition of a school age? The conventional definition puts it between 5 and 14, but the main tendency in our contemporary civilization—and it is visible in almost every country of importance—is for the school age to begin earlier and end later. The two great innovations of the present time, namely the nursery school and the health centre on the one hand and the village college on the other, are symbols of this new movement.

3. The standard of education may change to such an extent that additional school accommodation would be required to take care of this change even if the school population were declining.

One can list other considerations, but what has been already stated is enough to show that in the planning of any educational system there are sufficient variables to make a policy of *laissez-faire* rather more dangerous than in any other phase of human activity. It is not sufficient to let things drift and trust to evolution. It is



School at Langfuhr. The white surface forms a pleasing contrast to the green turf in which the school is set. Tree-planting, which in time will relieve the bare appearance of the long façade, has not yet been begun.

equally not satisfactory to create a rigid, largely deflationary policy of education and fit all schemes into it, or to propose easy solutions for the future, easy reconstructions of the existing system, and expect these to conform to our ideas of what should be done.

The main point is that the variables already mentioned are variables which come within the control of deliberate policy. If the policy is to provide as cheaply as possible soldiers and sailors and airmen, then there is no necessity for expensive education. If it is to make the greatest possible use of the human resources within the modern state, irrespective of whether they should be applied to warlike uses, then it is necessary to plan with the greatest circumspection and the most determined resolution. If the policy is to allow the citizen to lead a full life in conjunction with other citizens, then an educational policy must be part of a much greater plan defining the quality and the substance of the modern state.

In discussing the planning of schools, one should rather concentrate on the last two elements and ignore the first, and develop with advantage this double thesis :

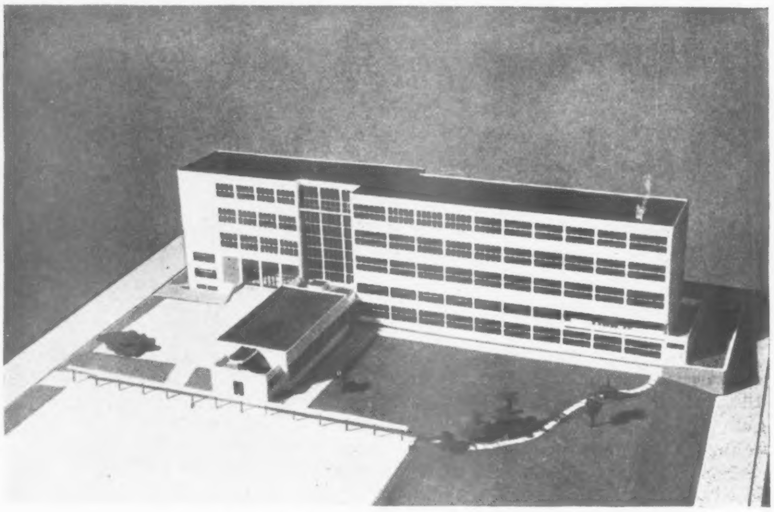
(*a*) That no educational policy has any value which applies to any definite school age.

(*b*) That no school is justified as a school alone : it must form part of much wider planning and be inseparable from it.

In other words, the problem of schools is not in the final analysis an educational problem at all. It is a problem of community planning, town planning, regional planning, economic and industrial planning.

During the past three years, possibly as a result of the preoccupation of the French Government with the birth rate and with the improvement of the physical quality of the population, as well as of the change in political opinion of certain key areas, a remarkable alteration has taken place in the French conception of what the school ought to be. It is no exaggeration to say that from the point of view of planning, both external and internal, the new French school represents a new phase in education.

One may not attach so much importance to the incorporation in the new schools of the nursery school idea as part of the educational system, and one may not even be impressed by the grafting on to primary schools of what might be regarded as vocational and pre-industrial departments. Those things have been attempted in isolation before ; what is important is the recognition that the responsibility of the State towards the family is something much greater than an unscientific and inadequate education



State School at Prague. Josef Vaclavik, architect.

extending over about nine years of a child's life.

The period of education has been more than doubled in these new schools and there is a closer relationship between the community in its more important social phases and the school as a means of giving expression to a guiding community consciousness. That is to be seen in small things as well as in large. The care with which external and internal colour schemes are arranged, the careful manipulation of light, the designing of the school furniture, the expansion of school amenities and the extensive use of decorative art in frescoes, bas-reliefs and statuary—all of those things have as much an ethical as an æsthetic significance. They educate as well as enlighten.

One can find in Holland and, to a small degree, in Germany, much the same attitude towards the fundamentals of education as an instrument for social progress and social enlightenment. It is, however, in this country that perhaps the most interesting experiments have been carried out. But owing to the parsimony of public authorities and the Government, they have either been carried out

BUDGET ESTIMATES : EXPENDITURE ON EDUCATION
(England, Wales and Scotland)
(000's omitted)

		£
1913–14	..	17,466
1920–21	..	54,046
1925–26	..	48,190
1930–31	..	55,115
1931–32	..	55,436
1932–33	..	51,589
1933–34	..	51,062
1934–35	..	52,938
1935–36	..	55,913
1936–37*	..	58,044

* Estimated.

as a result of private enterprise or their expression in actual buildings and equipment has been so circumscribed as to restrict their effect on the community.

Health Centres

The Pioneer Health Centre at Peckham, for example, falls logically into the conception of the modern school which is now being realized in France, but it brings a link between the adult and the juvenile population much closer still, with the limitation, however, that this link is a recreational and health link rather than an educational or æsthetic one. The Peckham Health Centre does not improve or widen the consciousness of a community interest so much as stimulate the feeling of a community indebtedness. It may show new possibilities of health improvement, but it does not establish ideals which are fundamental to the community's control of the methods by which the improvement in living conditions can be carried out. One could hardly expect it to do this.

Village College

When we come to the village college as Henry Morris has designed it at Sawston in Cambridgeshire, we find how circumscribed a fine idea may be by its architectural limitations. Architecturally, the Sawston Village College somewhat lacks the qualities of surprise, of imagination. So that the appreciation of colour, plastic beauty and of art generally is lessened.

In his second village college at Bottisham, Morris has improved on his first, and presumably the college at Histon, as designed by Maxwell Fry and Professor Gropius, may be a greater improvement still.

What is fine about the village college, even in its limited expression, is the idea of the responsibility of an education authority towards a whole community and the link at Sawston between the school and the community in all its phases is practically complete.

The community is now in the habit of using the college as an essential part of its every-day existence. It accepts its educational function as the normal part of the function of living within the community: the college is the community.

One could build out of the French schools, the Peckham Health Centre and the Village College something which would come close to what a school ought to be within a modern, decently civilized state, and despite the unwillingness of the Government to embark on a bold policy of adult education, this new type of community school must emerge within the next decade.

The main reasons for this emergence may be summarized :—

Redistributed Populations

I. There must be some attempt to effect a redistribution of population. This does not mean bringing population back into distressed areas as they are conventionally understood, or even the discovery of employment for the people within those areas. From a long-term standpoint, one must regard the process of evacuation of those areas as, on the whole, a desirable thing. It may be accompanied by hardship, but the responsibility for such hardship lies with the State. The maldistribution of population in the industrial areas was ignored until those areas ceased to be self-supporting. What is meant by better and intelligent distribution of population is rather the transfer from urban centres to rural areas and the maintenance of the rural population before such transfer takes place.

At the present time, the great increase in amenities open to the rural population, as represented by electricity, wireless and good road transport, has been instrumental in holding back some part of the movement towards the towns, but it has not dammed it altogether and the movement still continues. One of the main reasons for that movement is that an improvement in the physical conditions of life and the amenities of life is not in itself sufficient to hold the population in rural areas. There must be a more definite and a more intelligent community spirit, and that spirit can be created most effectively by a more advanced version of the village college.

II. Despite the intensified competition and the incessant call for cheapening production, the hours of labour in our modern industries must tend to decrease, and the satisfaction of the hours of leisure by some proper organization on a leisured basis is a problem which must be solved very soon, and the solution of that problem lies with a more intelligent and more courageous use of our educational machinery.

III. The movement towards self-sufficiency in national economy, as far as this country is concerned, must increase rather than diminish, and if this movement is not to lead to a reduction in the standards of living, owing to the narrowing of the mental horizon, quite apart from the physical conditions of life, then a deliberate attempt must be made to create a clearer view of human relationships, as far as they are defined by a community sense. In other words, the knowledge of life within a self-sufficient national economy may be stimulated and excited by the appreciation of those things which only an enlightened educational system can give.

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CURRENT PRICES

The wages are the standard Union rates of wages payable in London at the time of publication. The prices given below are for materials of good quality and include delivery to site in Central London area, unless otherwise stated. For delivery outside this area, adjustment should be made for the cost of transport. Though every care has been taken in its compilation, it is impossible to guarantee the accuracy of the list, and readers are advised to have the figures confirmed by trade inquiry. The whole of the information given is copyright.

WAGES

		s.	d.
Bricklayer	per hour	1	8
Carpenter	,,	1	8
Joiner	,,	1	8
Machinist	,,	1	8
Mason (Banker)	,,	1	8
,, (Fixer)	,,	1	9
Plumber	,,	1	8
Painter	,,	1	7
Paperhanger	,,	1	7
Glazier	,,	1	7
Slater	,,	1	8
Scaffolder	,,	1	4
Timberman	,,	1	4
Navvy	,,	1	3
General Labourer	,,	1	3
Lorryman	,,	1	5½
Crane Driver	,,	1	7
Watchman	per week	2 10	0

MATERIALS

EXCAVATOR AND CONCRETOR

		£	s.	d.
Grey Stone Lime	per ton	2	2	0
Blue Lias Lime	,,	1	16	6
Hydrated Lime	,,	3	0	9
Portland Cement, in 4 ton lots (d/d site, including Paper Bags)	,,	1	19	0
Rapid Hardening Cement, in 4-ton lots (d/d site, including Paper Bags)	,,	2	5	0
White Portland Cement, in 1-ton lots	,,	8	15	0
Thames Ballast	per Y.C.		6	6
¾" Crushed Ballast	,,		7	0
Building Sand	,,		7	6
Washed Sand	,,		8	6
2" Broken Brick	,,		8	0
¾" ,, ,,	,,		10	3
Pan Breeze	,,		6	6
Coke Breeze	,,		8	9

DRAINLAYER

BEST STONEWARE DRAIN PIPES AND FITTINGS

		4" s.	4" d.	6" s.	6" d.
Straight Pipes	per F.R.	0	9	1	1
Bends	each	1	9	2	6
Taper Bends	,,	3	6	5	3
Rest Bends	,,	4	3	6	3
Single Junctions	,,	3	6	5	3
Double	,,	4	9	6	6
Straight channels	per F.R.	1	6	2	6
¾" Channel bends	each	2	9	4	0
Channel junctions	,,	4	6	6	6
Channel tapers	,,	2	9	4	0
Yard gullies	,,	6	9	8	9
Interceptors	,,	16	0	19	6
IRON DRAINS:					
Iron drain pipe	per F.R.	1	6	2	6
Bends	each	5	0	10	6
Inspection bends	,,	9	0	15	0
Single junctions	,,	8	9	18	0
Double junctions	,,	13	6	30	0
Lead Wool	lb.		6	—	
Gaskin	,,		5	—	

BRICKLAYER

		£	s.	d.
Fletton	per M.	2	15	0
Grooved do.	,,	2	17	0
Phorpres bricks	,,	2	15	0
,, Cellular bricks	,,	2	15	0
Stocks, 1st quality	,,	4	11	0
,, 2nd ,,	,,	4	2	6
Blue Bricks, Pressed	,,	8	17	6
,, Wirecuts	,,	7	17	6
,, Brindles	,,	7	0	0
,, Bullnose	,,	9	0	0
Red Sand-faced Facings	,,	6	18	6
Red Rubbers for Arches	,,	12	0	0
Multicoloured Facings	,,	7	10	0
Luton Facings	,,	7	10	0
Phorpres White Facings	,,	3	17	3
,, Rustic Facings	,,	3	12	3
Midhurst White Facings	,,	5	0	0
Glazed Bricks, Ivory, White or Salt glazed, 1st quality:				
Stretchers	,,	21	0	0
Headers	,,	20	10	0
Bullnose	,,	27	10	0
Double Stretchers	,,	29	10	0
Double Headers	,,	26	10	0
Glazed Second Quality, *Less*	,,	1	0	0
,, Buffs and Creams, *Add*	,,	2	0	0
,, Other Colours	,,	5	10	0
2" Breeze Partition Blocks	per Y.S.		1	7
2½" ,, ,, ,,	,,		1	10
3" ,, ,, ,,	,,		2	1
4" ,, ,, ,,	,,		2	6

MASON

The following d/d F.O.R. at Nine Elms:

		s.	d.
Portland stone, Whitbed	F.C.	4	4½
,, ,, Basebed	,,	4	7½
Bath stone	,,	2	10
York stone	,,	6	6
,, ,, Sawn templates	,,	7	6
,, ,, Paving, 2"	F.S.	1	8
,, ,, ,, 3"	,,	2	6

SLATER AND TILER

First quality Bangor or Portmadoc slates d/d F.O.R. London station:

		£	s.	d.
24" × 12" Duchesses	per M.	28	17	6
22" × 12" Marchionesses	,,	24	10	0
20" × 10" Countesses	,,	19	5	0
18" × 10" Viscountesses	,,	15	10	0
18" × 9" Ladies	,,	13	17	6
Westmorland green (random sizes)	per ton	8	10	0
Old Delabole slates d/d in full truck loads to Nine Elms Station:				
20" × 10" medium grey per 1,000 (actual)		21	11	6
,, ,, green ,,	,,	24	7	4
Best machine roofing tiles	,,	4	5	0
Best hand-made do.	,,	4	17	6
Hips and valleys	each			9
,, hand-made	,,			9½
Nails, compo	lb.		1	4
,, copper	,,		1	6

CARPENTER AND JOINER

		£	s.	d.
Good carcassing timber	F.C.		2	2
Birch	as 1" F.S.			9
Deal, Joiner's	,, ,,			5
,, 2nds	,, ,,			4
Mahogany, Honduras	,, ,,		1	3
,, African	,, ,,		1	1
,, Cuban	,, ,,		2	6
Oak, plain American	,, ,,		1	0
,, Figured ,,	,, ,,		1	3
,, plain Japanese	,, ,,		1	2
,, Figured ,,	,, ,,		1	5
,, Austrian wainscot	,, ,,		1	6
,, English	,, ,,		1	11
Pine, Yellow	,, ,,		1	0
,, Oregon	,, ,,			4
,, British Columbian	,, ,,			4
Teak, Moulmein	,, ,,		1	3
,, Burma	,, ,,		1	2
Walnut, American	,, ,,		2	3
,, French	,, ,,		2	3
Whitewood, American	,, ,,		1	1
Deal floorings, ¾"	Sq.		18	6
,, 1"	,,	1	1	6
,, 1⅛"	,,	1	2	0
,, 1¼"	,,	1	5	0
,, 1½"	,,	1	10	0
Deal matchings, ½"	,,		14	0
,, ¾"	,,		15	6
,, 1"	,,	1	4	0
Rough boarding, ⅝"	,,		16	0
,, 1"	,,		18	0
,, 1½"	,,	1	6	0

Plywood, per ft. sup.

Thickness	⅛" A	⅛" B	⅛" BB	¼" A	¼" B	¼" BB	⅜" A	⅜" B	⅜" BB	½" A	½" B	½" BB
Qualities	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.
Birch 60 × 48	4	2½	2	5	3	2¾	7	5	4	8	6	5
Cheap Alder	–	2	1½	–	3½	2	–	–	–	–	–	–
Oregon Pine	–	2½	–	3	2¾	–	4	3½	–	5	4½	–
Gaboon Mahogany	4	3½	–	5	4½	–	7	6½	–	8	7	–
Figured Oak	6½	5	–	7½	5½	–	10	8	–	1/-	9	–

		d.
Scotch glue	lb.	8

SMITH AND FOUNDER

Tubes and Fittings

(The following are the standard list prices, from which should be deducted the various percentages as set forth below.)

		½"	¾"	1"	1½"	2"
Tubes, 2'–14' long	per ft. run	4	5½	9½	1/1	1/10
Pieces, 12"–23" long	each	10	1/1	1/11	2/8	4/9
,, 3"–11½" long	,,	7	9	1/3	1/8	3/-
Long screws, 12"–23½" long	,,	11	1/3	2/2	2/10	5/3
,, ,, 3" M–½" long	,,	8	10	1/5	1/11	3/6
Bends	,,	8	11	1/7½	2/7½	5/2
Springs not socketed	,,	5	7	1/1½	1/11½	3/11
Socket unions	,,	2/-	3/-	5/6	6/9	10/-
Elbows, square	,,	10	1/1	1/6	2/2	4/3
Tees	,,	1/-	1/3	1/10	2/6	5/1
Crosses	,,	2/2	2/9	4/1	5/6	10/6
Plain sockets and nipples	,,	3	4	6	8	1/3
Diminished sockets	,,	4	6	9	1/-	2/-
Flanges	,,	9	1/-	1/4	1/9	2/9
Caps	,,	3½	5	8	1/-	2/-
Backnuts	,,	2	3	5	6	1/1
Iron main cocks	,,	1/6	2/3	4/2	5/4	11/6
,, with brass plugs	,,	—	4/-	7/6	10/-	21/-

Discounts

TUBES.	Per cent.		Per cent.
Gas	65	Galvanized gas	52½
Water	61¼	,, water	47½
Steam	57½	,, steam	42½

FITTINGS.			
Gas	57½	Galvanized gas	47½
Water	52½	,, water	42½
Steam	47½	,, steam	37½

		s.	d.
Rolled steel joists cut to length	cwt.	12	9
Mild steel reinforcing rods, ⅜"	,,	10	6
,, ,, ½"	,,	10	3
,, ,, ⅝"	,,	10	0

SMITH AND FOUNDER—*continued*

		s.	d.
Mild steel reinforcing rods, ¾"	cwt.	9	6
,, ,, ⅞"	,,	9	6
,, ,, 1"	,,	9	6
,, ,, 1¼"	,,	9	6
,, ,, 1½"	,,	9	6

		3" s.	3" d.	4" s.	4" d.
Cast-iron rain-water pipes of ordinary thickness metal	F.R.		8		10
Shoes	each	2	0	3	0
Anti-splash shoes	,,	4	6	8	0
Boots	,,	3	0	4	0
Bends	,,	2	7	3	9
,, with access door	,,	—		6	3
Heads	,,	4	0	5	0
Swan-necks up to 9" offsets	,,	3	9	6	0
Plinth bends, 4½" to 6"	,,	3	9	5	3
Half-round rain-water gutters of ordinary thickness metal	F.R.		5		6
Stop ends	each		6		6
Angles	,,	1	7	1	11
Obtuse angles	,,	2	0	2	6
Outlets	,,	1	9	2	3

PLUMBER

		s.	d.
Lead, milled sheets	cwt.	24	6
,, drawn pipes	,,	24	6
,, soil pipe	,,	30	0
,, scrap	,,	16	0
Solder, plumbers'	lb.		9½
,, fine do.	,,	1	0
Copper, sheet	,,		8½
,, tubes	,,		11

L.C.C. soil and waste pipes:		3" s.	3" d.	4" s.	4" d.	6" s.	6" d.
Plain cast	F.R.	1	0	1	2	2	6
Coated	,,	1	1	1	3	2	8
Galvanized	,,	2	0	2	6	4	6
Holderbats	each	3	10	4	0	4	9
Bends	,,	3	9	5	3	10	3
Shoes	,,	2	10	4	4	9	6
Heads	,,	4	8	8	5	12	9

PLASTERER

		£	s.	d.
Lime, chalk	per ton	2	5	0
Plaster, Coarse	,,	2	10	0
,, fine	,,	4	15	0
Hydrated lime	,,	3	[illegible]	9
Sirapite	,,	3	6	0
Keene's cement	,,	5	0	0
Gothite Plaster	,,	3	6	0
Pioneer Plaster	,,	3	6	0
Thistle plaster	,,	3	6	0
Sand, washed	Y.C.		11	6
Hair	lb.			6
Laths, sawn	bundle		2	4
,, rent	,,		3	9
Lath nails	lb.			3

GLAZIER

		s. d.	s. d.
Sheet glass, 21 oz., squares n/e 2 ft. s.	F.S.		2½
,, ,, 26 oz. ,, ,,	,,		3
Flemish, Arctic, Figures (white)*	,,		7
Blazoned glasses	,,		2 6
Reeded: Cross Reeded	,,		11
Cathedral glass, white, double-rolled, plain, hammered, rimpled, waterwite	,,		6
Crown sheet glass (n/e 12" × 10")	,,		2 [illegible]
Flashed opals (white and coloured)	,,	1 0 and	2 0
⅛" rough cast; rolled plate	,,		5½
¼" wired cast; wired rolled	,,		9½
¼" Georgian wired cast	,,		11
¼" Polished plate, n/e 1 ft.	,,	†10 to	‡1 1
,, ,, 2	,,	†1 2 ,,	‡1 4
,, ,, 4	,,	†2 3 ,,	‡2 6
,, ,, 8	,,	†2 9 ,,	‡3 2
,, ,, 20	,,	†3 1 ,,	‡3 9
,, ,, 45	,,	†3 3 ,,	‡4 0
,, ,, 100	,,	†4 0 ,,	‡4 10
Vita glass, sheet, n/e 1 ft.	,,		1 0
,, ,, ,, 2 ft.	,,		1 3
,, ,, ,, over 2 ft.	,,		1 9
,, ,, plate, n/e 1 ft.	,,		1 6
,, ,, ,, 2 ft.	,,		3 0
,, ,, ,, 5 ft.	,,		4 0
,, ,, ,, 7 ft.	,,		5 0
,, ,, ,, 15 ft.	,,		6 0
,, ,, ,, over 15 ft.	,,		7 6
"Calorex" sheet 21 oz., and 32 oz.	,,	2 6 and	3 6
,, rough cast ⅛" and ¼"	,,	8½ ,,	1 0
Putty, linseed oil	lb.		3

* *Colours, 1d. F.S. extra.*

† *Ordinary glazing quality.* ‡ *Selected glazing quality.*

PAINTER

		£	s.	d.
White lead in 1 cwt. casks	cwt.	2	8	6
Linseed oil	gall.		2	3
Boiled oil	,,		2	9
Turpentine	,,		4	1½
Patent knotting	,,		14	0
Distemper, washable	cwt.	2	6	0
,, ordinary	,,	2	0	0
Whitening	,,		4	0
Size, double	firkin		3	0
Copal varnish	gall.		13	0
Flat varnish	,,		14	0
Outside varnish	,,		16	0
White enamel	,,	1	15	0
Ready mixed paint	,,		13	6
Brunswick black	,,		7	6

CURRENT PRICES FOR MEASURED WORK

The following prices are for work to new buildings of average size, executed under normal conditions in the London area. They include establishment charges and profit. While every care has been taken in its compilation, no responsibility can be accepted for the accuracy of the list. The whole of the information given is copyright.

EXCAVATOR AND CONCRETOR

		£ s. d.
Digging over surface n/e 12" deep and cart away	Y.S.	2 9
,, to reduce levels n/e 5' 0" deep and cart away	Y.C.	8 6
,, to form basement n/e 5' 0" and cart away	,,	9 0
,, ,, 10' 0" deep and cart away	,,	9 6
,, ,, 15' 0" deep and cart away	,,	10 0
If in stiff clay	add	6
If in underpinning	,, ,,	4 0
Planking and strutting to sides of excavation	F.S.	1 0
,, ,, to pier holes	,,	5
,, ,, to trenches	,,	5
,, ,, extra, only if left in	,,	3
Hardcore, filled in and rammed	Y.C.	10 0
Portland cement concrete in foundations (6–1)	,,	1 6 0
,, ,, (4-2-1)	,,	1 12 6
,, ,, underpinning	,,	1 16 0
Finishing surface of concrete, space face	Y.S.	7

DRAINLAYER

		4" s. d.	6" s. d.
Stoneware drains, laid complete (digging and concrete to be priced separately)	F.R.	1 6	2 3
Extra, only for bends	Each	2 8	3 9
,, junctions	,,	3 9	4 6
Gullies and gratings	,,	16 6	18 0
Cast iron drains, and laying and jointing	F.R.	4 9	6 9
Extra, only for bends	Each	10 6	15 6

BRICKLAYER

		£ s. d.
Brickwork, Flettons in lime mortar	Per Rod	26 10 0
,, ,, in cement	,,	27 12 6
,, Stocks in cement	,,	34 0 0
,, Blues in cement	,,	50 0 0
Extra only for circular on plan	,,	2 0 0
,, backing to masonry	,,	1 10 0
,, raising on old walls	,,	2 0 0
,, underpinning	,,	5 10 0½
Fair Face and pointing internally	F.S.	1¼
Extra over fletton brickwork for picked stock facings and pointing	,,	8
,, ,, ,, red brick facings and pointing	,,	11
,, ,, ,, blue brick facings and pointing	,,	1 4
,, ,, ,, glazed brick facings and pointing	,,	3 6
Tuck pointing	,,	7½
Weather pointing in cement	,,	3
Slate dampcourse	,,	10
Vertical dampcourse	,,	1 1

ASPHALTER

		s. d.
½" Horizontal dampcourse	Y.S.	4 9
¾" Vertical dampcourse	,,	7 9
¾" paving or flat	,,	6 3
1" paving or flat	,,	7 6
1" × 6" skirting	F.R.	1 0
Angle fillet	,,	2½
Rounded angle	,,	2½
Cesspools	Each	5 6

MASON

		£ s. d.
Portland stone, including all labours hoisting, fixing and cleaning down, complete	F.C.	17 9
Bath stone and do., all as last	,,	13 6
Artificial stone and do.	,,	13 0
York stone templates, fixed complete	,,	10 6
,, thresholds	,,	13 6
,, sills	,,	1 0 6

SLATER AND TILER

		£ s. d.
Slating, Bangor or equal to a 3" lap, and fixing with compo nails, 20" × 10"	Sqr.	3 10 0
Do., 18" × 9"	,,	3 7 0
Do., 24" × 12"	,,	3 17 0
Westmorland slating, laid with diminished courses	,,	6 0 0
Tiling, best hand-made sand-faced, laid to a 4" gauge, nailed every fourth course	,,	3 0 0
Do., all as last, but of machine-made tiles	,,	2 16 0
20" × 10" medium Old Delabole slating, laid to a 3" lap (grey)	,,	2 16 0
,, ,, ,, ,, ,, ,, (green)	,,	4 15 0

CARPENTER AND JOINER

		£ s. d.
Flat boarded centering to concrete floors, including all strutting	Sqr.	2 2 6
Shuttering to sides and soffits of beams	F.S.	7
,, to stanchions	,,	7
,, to staircases	,,	1 6
Fir and fixing in wall plates, lintols, etc.	F.C.	3 9
Fir framed in floors	,,	4 6
,, ,, roofs	,,	6 6
,, ,, trusses	,,	7 6
,, ,, partitions	,,	8 6
¾" deal sawn boarding and fixing to joists	Sqr.	1 14 6
1" ,, ,, ,, ,, ,,	,,	1 17 6
1¼" ,, ,, ,, ,, ,,	,,	2 3 0
¾" × 2" fir battening for Countess slating	,,	9 6
Do., for 4" gauge tiling	,,	12 0
Stout feather-edged tilting fillet	F.R.	4½
Patent inodorous felt, 1 ply	Y.S.	2 3
,, ,, ,, 2 ,,	,,	2 9
,, ,, ,, 3 ,,	,,	3 3
Stout herringbone strutting to 9" joists	F.R.	10½
1" deal gutter boards and bearers	F.S.	1 2
1¼" ,, ,, ,,		1 6
2" deal wrought rounded roll	F.R.	8
1" deal grooved and tongued flooring, laid complete, including cleaning off	Sqr.	2 1 0
1¼" do.	,,	2 10 0
1½" do.	,,	2 17 0
1" deal moulded skirting fixed on, and including grounds plugged to wall	F.S.	1 6
1½" do.	,,	1 9

CARPENTER AND JOINER—*continued*

		s. d.
1½" deal moulded sashes of average size	F.S.	1 9½
2" ,, ,, ,, ,,	,,	1 11½
1½" deal cased frames double hung, of 6" × 3" oak sills, 1¼" pulley stiles, 1¼" heads, 1" inside and outside linings, ⅜" parting beads, and with brass faced axle pulleys, etc., fixed complete	,,	3 7
2" ,, ,, ,, ,, ,,	,,	3 10
Extra only for moulded horns	Each	6
1½" deal four-panel square, both sides, door	F.S.	2 0
2" ,, ,, ,, ,,	,,	2 8
1½" ,, but moulded both sides	,,	2 4
2" ,, ,, ,,	,,	3 0
4" × 3" deal, rebated and moulded frames	F.R.	1 0
4½" × 3½" ,, ,, ,,	,,	1 4
1¼" deal tongued and moulded window board, on and including deal bearers	F.S.	1 9
1¼" deal treads, 1" risers in staircases, and tongued and grooved together on and including strong fir carriages	,,	2 6
1½" deal moulded wall strings	,,	2 1
1½" ,, outer strings	,,	2 4
Ends of treads and risers housed to string	Each	1 9
3" × 2" deal moulded handrail	F.R.	1 3
1" × 1" deal balusters and housing each end	Each	2 0
1½" × 1½" ,, ,, ,,	,,	2 9
3" × 3" deal wrought framed newels	F.R.	1 3
Extra only for newel caps	Each	6 0
Do., pendants	,,	6 0

SMITH AND FOUNDER

		£ s. d.
Rolled steel joists, cut to length, and hoisting and fixing in position	Per cwt.	16 6
Riveted plate or compound girders, and hoisting and fixing in position	,,	1 0 6
Do., stanchions with riveted caps and bases and do.	,,	19 0
Mild steel bar reinforcement, ½" and up, bent and fixed complete	,,	17 6
Corrugated iron sheeting fixed to wood framing, including all bolts and nuts 20 g.	F.S.	11
Wrot-iron caulked and cambered chimney bars	Per cwt.	1 10 0

PLUMBER

		£ s. d.
Milled lead and labour in flats	cwt.	1 18 6
Do. in flashings	,,	2 2 0
Do. in covering to turrets	,,	2 7 6
Do. in soakers	,,	1 13 3
Labour to welted edge	F.R.	3½
Open copper nailing	,,	3
Close ,, ,,	,,	4

		½" s. d.	¾" s. d.	1" s. d.	1¼" s. d.	2" s. d.	4" s. d.
Lead service pipe and fixing with pipe hooks	F.R.	10	1 0	1 3	2 0	2 10	—
Do. soil pipe and fixing with cast lead tacks	,,	—	—	—	—	—	5 6
Extra, only to bends	Each	—	—	—	—	2 0	6 9
Do. to sto ends	,,	6½	8	9	11	1 0	—
Boiler screws and unions	,,	3 3	3 9	5 0	8 0	—	—
Lead traps	,,	—	—	—	6 3	8 9	—
Screw down bib valves	,,	6 9	9 6	11 0	—	—	—
Do. stop cocks	,,	7 0	9 6	12 6	—	—	—

		s. d.
4" cast-iron ½-rd. gutter and fixing	F.R.	1 0
Extra, only stop ends	Each	1 0
Do. angles	,,	1 6
Do. outlets	,,	2 9
4" dia. cast-iron rain-water pipe and fixing with ears cast on	F.R.	1 2
Extra, only for shoes	Each	1 3
Do. for plain heads	,,	5 6

PLASTERER AND TILING

		s. d.
Expanded metal lathing, small mesh	Y.S.	2 0
Do. in n/w to beams, stanchions, etc.	,,	2 9
Lathing with sawn laths to ceilings	,,	1 3
½" screeding in Portland cement and sand or tiling, wood block floor, etc.	,,	1 5
Do. vertical	,,	1 7
Rough render on walls	,,	1 2½
Render, float and set in lime and hair	,,	1 9
Render and set in Sirapite	,,	1 11
Render, backing in cement and sand, and set in Keene's cement	,,	2 9
Extra, only if on lathing	,,	4
Keene's cement, angle and arris	F.R.	6
Arris	,,	1½
Rounded angle, small	,,	3
Plain cornices in plaster, including dubbing out, per 1" girth	,,	1½
1" granolithic pavings	Y.S.	3 6
1½" ,,	,,	4 6
6" × 6" white glazed wall tiling and fixing on prepared screed	,,	17 6
9" × 3" ,, ,, ,, ,, ,,	,,	1 2 6
Extra, only for small quadrant angle	F.R.	8

GLAZIER

		s. d.
21 oz. sheet glass and glazing with putty	F.S.	6½
26 oz. do. and do.	,,	7½
Flemish, Arctic Figured (white) and glazing with putty	,,	1 1
Cathedral glass and do.	,,	1 2
Glazing only, British polished plate	,,	7
Extra, only if in beds	,,	2
Washleather	F.R.	4

PAINTER

		s. d.
Clearcolle and whiten ceilings	Y.S.	6
Do. and distemper walls	,,	9
Do. with washable distemper	,,	1 1
Knot, stop, prime and paint four coats of oil colour on plain surfaces	,,	3 3
Do. on woodwork	,,	3 6
Do. on steelwork	,,	3 6
Do. and brush grain and twice varnish	,,	5 0
Stain and twice varnish woodwork	,,	1 11
Stain and wax-polish woodwork	,,	4 6
French polishing	F.S.	1 2
Stripping off old paper	Piece	2 0
Hanging ordinary paper . . . from	,,	2 9

5.

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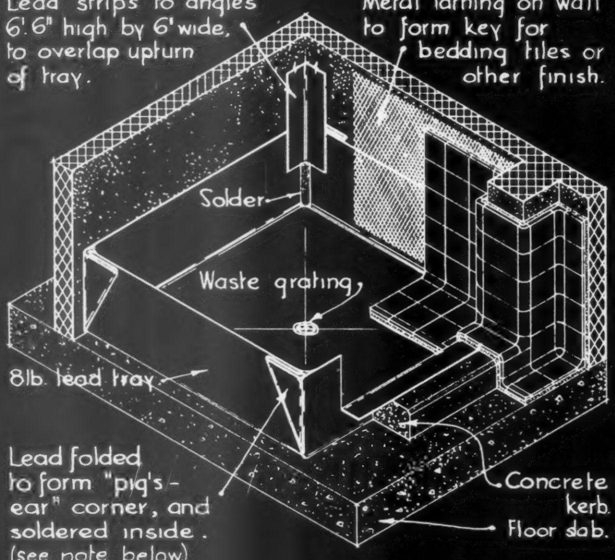
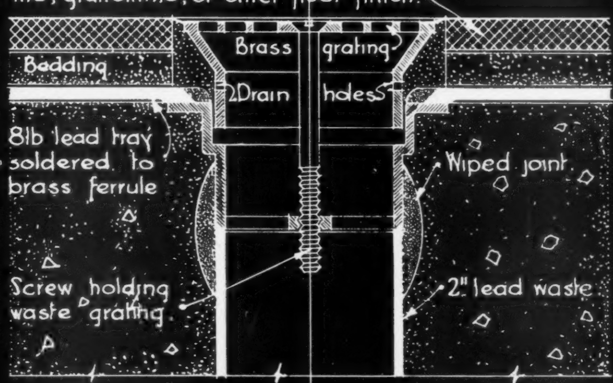
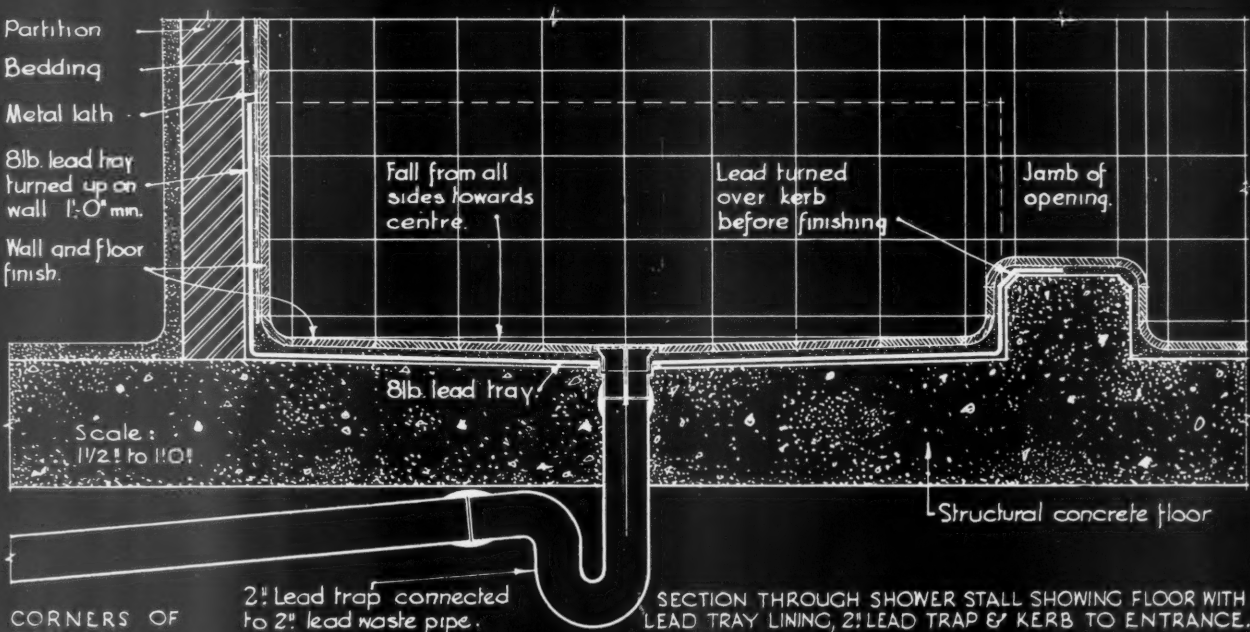
ISOMETRIC DETAIL. Scale: 1/2" to 1'.0"



HALF FULL SIZE DETAIL OF OUTLET:

The lead tray is soldered to a brass ferrule, with a waste grating secured by a screw. Holes are drilled in the ferrule level with the surface of the lead for the purpose of draining any water which may penetrate the floor finish. The ferrule is joined to a lead trap and waste pipe with a wiped joint.

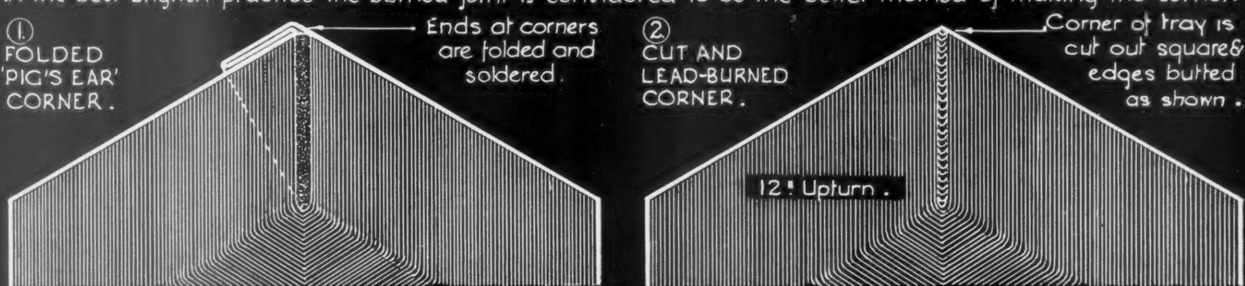




SECTION THROUGH SHOWER STALL SHOWING FLOOR WITH LEAD TRAY LINING, 2" LEAD TRAP & KERB TO ENTRANCE.

CORNERS OF TRAY:

In the best English practice the burned joint is considered to be the better method of making the corner.



ALTERNATIVE METHODS OF FORMING CORNERS OF LEAD TRAY: Scale: 1" to 1'.0"

Information from the Lead Sheet & Pipe Developement Council.

INFORMATION SHEET: LEAD TRAY TO SHOWER BATH STALL. 21.

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INFORMATION SHEET

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PLUMBING

Subject : Lead Linings to Shower Baths

Linings under the floor and wall finish to shower stalls are not always provided in this country.

Such precautions against leakage are, however, common practice in the U.S.A., and in many cities the building regulations call for lead trays of the type shown here to be provided in all cases.

The details given on this sheet are of the linings provided to all shower compartments in the New Amsterdam Apartments in New York. 8 lbs. lead sheet was used and delivered to the job cut to size, i.e. about 2 ft. larger in each dimension than the shower stall floor. The sheet was then bent up 1 ft. on each side. The corner was made by folding the lead at the corner back on itself to form a " pig's ear "; this was then soldered up as shown in the detail. In English practice it is considered better craftsmanship to use the burned butt joint.

Depth of Tray :

The depth of the tray was in this case 12 in., but it is common for this dimension to be increased.

Coating the Lead :

The underside of the lead tray should be given a bituminous coating before laying to protect the lead from the corrosive attacks of lime or cement in the floor. It should also be coated on the upper side before the floor finish is applied.

Pounding of Lead :

The tray when in position should be well pounded down to ensure that it fits close at all points to the inequalities of the floor, leaving no pockets which would cause settlement after the floor finish was laid.

Adjoining Shower Stalls :

Where a number of stalls adjoin one another, individual trays of the type shown are used if the divisions between stalls are carried down to the floor.

Where screens only are provided and they are stopped above the floor, a continuous lead tray of the same type is used, and joints, if necessary, are made with the usual folded seams.

Weight of Lead :

In the example shown, 8 lbs. lead was used, and this weight is to be recommended wherever possible; 6 lbs. lead is, however, sometimes used where the maximum economy is a necessity.

Information from - The Lead Sheet and Pipe Development Council

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03.

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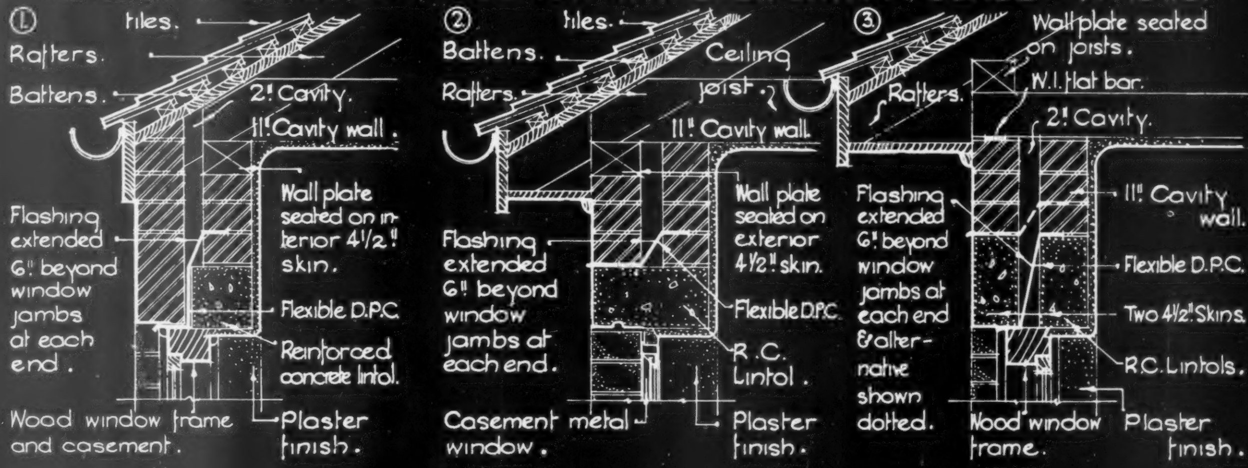
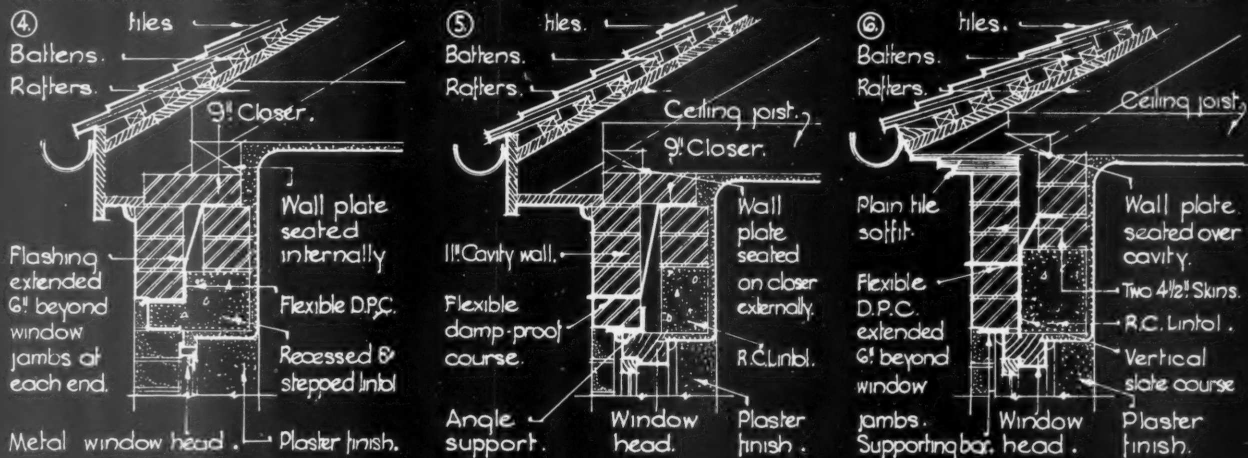
VARIOUS DETAILS OF CAVITY WALL CONSTRUCTION :

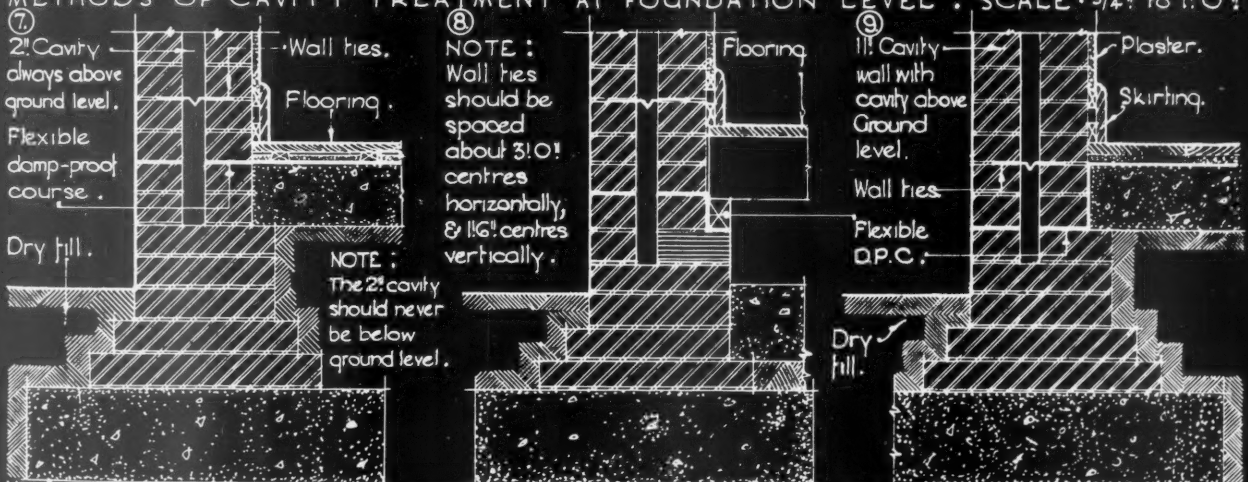
METHODS OF EAVES CONSTRUCTION WITH OPEN CAVITY : SCALE · 3/4" to 1'.0"



METHODS OF EAVES CONSTRUCTION WITH CLOSED CAVITY : SCALE · 3/4" to 1'.0"



METHODS OF CAVITY TREATMENT AT FOUNDATION LEVEL : SCALE · 3/4" to 1'.0"



NOTE · For footings and D.P.C's of hard engineering brick, see future information sheet.

Information from Clay Products Technical Bureau of Great Britain.

INFORMATION SHEET : CAVITY WALL CONSTRUCTION · NUMBER 1 ·

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Supplement to THE ARCHITECTS' JOURNAL for May 28, 1936

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INFORMATION SHEET

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BRICKWORK

Subject : Cavity Wall Construction

The details given on this Information Sheet are intended to cover the main variations of detail in the construction of brick cavity walls.

The most important variations shown in details Nos. 1 to 6, are in the method of carrying the wall plate for the roof timbers, the arrangement of the lintol or lintols over the window and in the flashing over the window. The variations in the arrangement of the damp-proof course depend primarily upon the floor construction used ; those shown are normal cases ; further details are to be given on a subsequent Information Sheet.

Cavity Wall Construction

By separating the brickwork of an external wall into two separate substantially isolated leaves, the following advantages accrue :—

(1) Rain and moisture, collecting on and in the outer leaf, cannot penetrate to the inner leaf (and thence to the interior of the structure), provided adequate attention be paid to associated detail.

(2) A. *If the cavity be closed*, the stationary air in the cavity wall will act as a thermal buffer, to prevent heat loss outwards during cold weather and to keep the interior cool during hot, sunny weather.

B. *If the cavity be ventilated* such moisture as may penetrate to the inner face of the outer leaf is quickly evaporated and dispersed, so that excessively damp conditions favourable to condensation and to the development of dry rot in associated woodwork cannot arise. It must, however, be noted that, by the introduction of such ventilation, the thermal buffer effect of stationary air, obtainable by closing the cavity, is sacrificed, particularly during cold weather, when the warm inner leaf induces up-currents which carry off some heat.

The Ventilation of Cavities

For the reasons given above technical opinion is divided as regards the respective merits of closed and ventilated cavity construction. Certain building authorities make cavity ventilation compulsory, and, when used, it is often convenient to utilize the up-currents in the cavity to improve sub-floor ventilation. This can be done by inserting, at suitable points through the base of the wall, vitrified or other adequately damp-proof coursed air-bricks, thus connecting the sub-floor with the outer air ; then, by inserting air-bricks through the inner leaf only (as in Detail 8) at other points, the draughts up the cavity, discharging through air-bricks in the top of the outer leaf, will afford positive ventilation of both sub-floor and cavity.

Details Requiring Careful Attention

A. *Bottom of the Cavity*. The cavity should always finish *below the damp-proof course but above ground level*. If carried below ground level, water which may collect in the bottom of the cavity (by seepage through the brickwork) will tend to fill the cavity with moist air. Again the cavity must *not finish on the Damp-proof Course*, since under such circumstances, the damp-proof course will act as a tray, passing on to the inner leaf moisture draining from the outer leaf.

(The bottom of the cavity may be provided with a cement mortar coving, sloping towards the outer leaf. Such coving, in conjunction with weep holes left at intervals in the vertical brick joints level with the cavity bottom, serves to discharge any condensed moisture, etc., running down the inner face of the outer leaf.)

B. *Mortar droppings during construction*. The bridging of the cavity by mortar droppings collecting at the bottom of the cavity or on the wall ties must be scrupulously avoided by the use, during construction, of movable horizontal battens.

C. *Extension of flashings at openings*. The lateral extension of flashings at least 6 ins. beyond the jambs of openings is essential.

D. *Damp-proofing of window and door heads and cill level*. Since openings in the brickwork, such as doorways and windows, entail the cavity being bridged, every care must be taken adequately to damp-proof course such openings.

Thickness of Walls

In this and in other Information Sheets cavity walls are shown as two 4½ ins. walls tied together, as commonly used for small domestic construction. It is, however, recommended that the inner leaf should be 9 ins. thick wherever possible, especially where :—

(1) The height of the wall structure is more than one storey.

(2) The floor loads are likely to be high.

(3) High thermal insulation is deemed desirable (as on very exposed sites).

(4) Severe side thrust is to be anticipated.

Damp-proof Courses at Foundation and Roof Levels

In this series of details, flexible or slate damp-proof courses have been shown throughout. Engineering bricks of low porosity laid in cement mortar have much to commend them, both at foundation level, where they can be used as combined footings and damp-proof course, and for unseen work at the top of the cavity. An Information Sheet dealing with the use of engineering brick for these purposes is to be issued in this series.

Prevention of Damp Invasion and Subsequent Dry Rot in Ground Floor Timber laid Direct on Concrete (Details 7 and 9)

Although not peculiar to cavity wall construction, the practice of placing timber floors directly in contact with concrete filling or on light joists embedded in such filling, encourages dry rot unless special precautions be taken to place a continuous damp-proof course between the concrete and the timber and to ensure that it is continuous with the damp-proof course in the walls. An ancillary vertical damp-proof course running down between the inner face of the wall and the concrete has much to recommend it. A method of linking up the ventilating of open sub-floor construction with the cavity has already been described.

Previous Sheets

Information Sheets previously issued by this Bureau are Nos. 331, Standard sizes of Clay bricks ; and 334, Cost of buildings ; and 343, Retaining walls.

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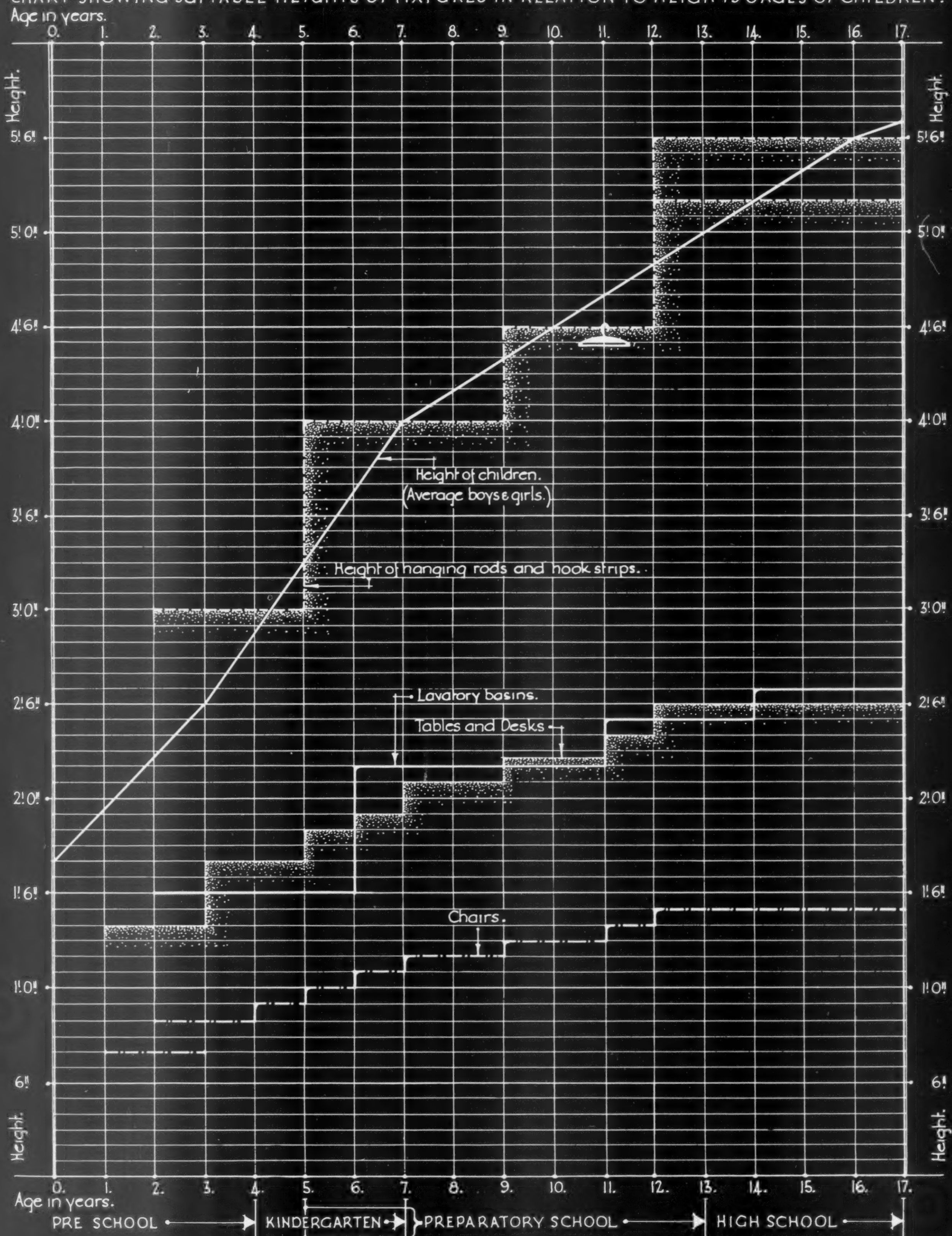
CHART SHOWING SUITABLE HEIGHTS OF FIXTURES IN RELATION TO HEIGHTS & AGES OF CHILDREN :



Information extracted from Architectural Graphic Standards.

INFORMATION SHEET : CHILDRENS' FURNITURE, FIXTURES AND EQUIPMENT.

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INFORMATION SHEET
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HEIGHTS OF SCHOOL FITTINGS

The graph on the front of this Sheet shows the necessary heights in relation to the age of the children, for various standard fittings, such as coat hangers, tables and lavatories.

The generally accepted ages for the different types of school are as follows :—

Nursery and Infant Schools ...	age 2-7
Elementary Schools—	
Juniors	age 7-11
Seniors	age 11-14
Central Schools	age 15-16
Continuation Schools	age 16-18