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ROYAL ARCHITECTURAL INSTITUTE OF CANADA

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ROYAL ARCHITECTURAL INSTITUTE OF CANADA

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Secretary to Editorial Board, Mrs Vera Williams

Toronto May 1951

EDITORIAL

LAST NIGHT we attended a meeting of the Toronto Chapter of the Ontario Association of Architects, and we could not help thinking on the never changing problems of the profession.

Each generation has its young men demanding action, and its old men giving them their blessing. For the old men of the Toronto Chapter, this was where they "came in" twenty or forty years ago. So unchanging are the problems that we could anticipate them without looking at the agenda. Only one was missing in 1951, and that was the need for action in regard to plans for small houses. On the whole, we were far from being a youthful group, and that may account for the omission of the small house. The impact of the veteran graduates is not yet felt, but when it is, we shall see the small house plan high on the agenda – as it was in 1920, and, for all we know, in 1910 and 1890. So far as we are concerned, the support and vitality of the veteran graduate cannot come too quickly in the small house field. We have a feeling of personal guilt in the matter because the urgent need for a solution was dropped in our lap by no less a person than the President of the RAIC. At the moment, we sit baffled by this most frustrating and important of problems. In 1920, we would have made the prediction, without fear of contradiction, that, in thirty year's time, the problem would have been taken from our hands and conscience by technology – that prefabrication or a mould would produce cottages at a price that only the very poor could not afford to pay. We would have been entirely wrong.

However baffling the problem may be, we cannot avoid it or shirk it. We may launch plans for greenbelts, for city hall squares and noble vistas, we may write Pharisaical letters about our treatment of D. P. architects, but all are but a smoke screen for the real problem, the small house brat on our doorstep. Once upon a time, it would appear that all we needed were plans of great ingenuity which mass building would put within the budget of the white collar worker. Inflation proved that to be a fallacy. The plans are there, but the house itself is a will o' the wisp for the financial group we have in mind.

The solution now may lie only in a concerted effort in which architects, the National Research Foundation and the building industry join. We should like to think that, even at this late date, the initiative will come from the architectural profession. We are all thinking today in terms of publicity, and much paper is being employed to emphasize the value of the services of doctor or architect. A million dollars so spent could not compete with the simple statement of the Law Society of Upper Canada that it had put into effect a plan for giving free legal advice to the poor of Ontario. As architects, we lack the resources of the Law Society, and our particular services involve payments to others in time and material that are costly to the architect.

In the architectural profession, we too have a body of men keenly sensible of the responsibilities that go with the "protection" of a profession, and eager to play a part that will contribute to the betterment of several million of their countrymen. The challenge of the small house has not been taken up.

A. LESLIE PERRY

MAINTENANCE AND MATERIALS IN SCHOOLS

This is a subject that is of great interest in these days of high building costs as every Architect knows that it is fairly simple to pick out materials that are easy to maintain but generally these are relatively expensive. It therefore is our job to weigh the merits of high first cost, interest and amortization against annual maintenance costs. This may not appear too important because in most Provinces the Government gives a grant of 50 per cent of the buildings cost, the remainder being paid for by bonds which must be amortized in about forty years. Excessive first cost therefore can result in higher annual charges to the taxpayers than the additional maintenance cost accompanying less costly materials. Architects with experience in school design have done this to varying degrees so my observations may be open to discussion but I have found the following suggestions to work out very well.

Considering first the exterior of a school structure, it is immediately apparent that we architects have streamlined our façades so that costly gothic exteriors and elaborate Georgian doorways are a thing of the past. Obviously these features had high maintenance costs with frequent repointing and expensive painting work. Our profession deserves a great deal of credit from the public for the realistic way that we have countered high building costs at the expense of our inclinations.

The main wall material is still brick and here we can help the taxpayers pocket book by using local bricks, usually red. Having decided on brick, mortar must be considered and for Eastern Canada a non-shrink mortar with joints well filled is essential. Parapets, if any, should have a real bond, like English or Flemish. These walls must be completely covered on the roof side and on top with metal flashing which must be anchored down to resist hurricanes as Canada has become a "high-wind" zone. Neglect of this has been costly to more than one school board. How we are going to get bricklayers to fill their joints is another matter!

Naturally we must keep down the amount of woodwork to reduce painting costs and glass blocks are an effective answer. When used the exterior joints should be painted as these often leak and damage results to plaster and paint. Glass bricks are commonly used for the top four-fifths of classroom windows but this will be found expensive compared to wood. A warning should be given that their use results in excessive temperatures in the classrooms from the build up due to the sun on the blocks. Artificial ventilation to neutralize this, requires at least five air changes and is costly; open windows provide this easily "for free." Mechanical systems of ventilating, unless doing the heating, are therefore hardly justified, certainly not from any improvement in the health of the children.

Exterior woodwork if treated with a primer making use of the principle of "Osmosis" will not rot at the sills and will prolong the life of the paint. Dipping in this primer can be done by the large millworkers. This is important and not expensive.

Maintenance and materials regarding roofs is simplified as all new schools have flat or semi-flat roofs. Nevertheless there is one point that should be avoided in cold climates and that is: too much insulation and roofs that hold water. The combination of the two permits of a heavy formation of ice which adheres to the roof covering and as the ice expands and contracts, the felt is pulled apart or buckled, resulting in leaks and expensive repairs.

The chief maintenance concern of school board is the interior finish. The care of these interior surfaces has been thoroughly studied by the *National Committee for School Health Research* and a copy of their Manual No 5 for caretakers should be in every school building. This book makes it evident that the architect can assist by specifying materials which require the minimum up keep and so reduce the daily cleaning routine.

The obvious part of a building requires the most attention is the floor, and with the advent of movable furniture it is now possible to provide covering that greatly speed up the janitor's work and at the same time improves the health of the students. It is a recognized fact that germs are carried and nourished by dust so this should be kept in mind when designing. As dust settles unless disturbed, it is obvious that a floor should have as few crevices as possible. Wood floors are therefore the worst. A homogeneous material like linoleum is the best. Rubber tile is good but expensive. Asphalt tile is inexpensive but is slippery and will crack if there are any unevenesses in the floor. There is a new asphalt tile that is resilient and will not crack but unfortunately its extra cost is considerable. Ordinary asphalt tile for schools should be three-sixteenths of an inch thick. Some schools use terrazzo for corridors and this material is easy to maintain and wears indefinitely. It is noisy but with sound absorbing ceilings this is not objectionable. Waxing is not necessary if water wax is added in small quantities to the water used for washing.

The gym floor is perhaps the most troublesome item, a hardwood floor has so much sentiment connected with it that its use is still general. In a building where there is space below the floor a steel joist construction with two and a half inches of concrete gives a springy effect without the high cost of floating floors on springs etc. This can be covered with wood block units bedded in mastic at less cost than sleepers fill and underfloor. A good lacquer rubbed is the best surface. Where the room is a multiple use affair flexible asphalt is hard to beat. If funds are available this tile can be laid on one inch of asphalt instead of cement finish giving more resilience. One of the heavy maintenance costs of annually repainting playing lines can be eliminated by inlaying these using asphalt strips. Such a floor can be used at all times without fear of damaging the surface as with wood. It will stand washing and rewaxing at will. While it is less resilient for basketball the children soon get accustomed to the surface and schools who have had such floors for years are quite happy about them.

In multi-floor schools staircases are important. Examination of old schools demonstrates that steps of slate or marble wear badly. Metal treads are noisy and dangerous. There seems to be a good case for cast-in-place terrazzo with rounded corners with non slip tile nosings or inset strips. Such staircases are the least expensive, are easy to clean, wear well and are not dangerous. The handrails if of iron are expensive, are difficult to clean and are hazardous. A solid wall with handrails bolted through is a device that has none of these objections.

Wall treatment is the greatest item in annual maintenance. As light reflection is important light colours are a must. If this is accomplished with smooth plaster and flat paint the walls are covered with finger marks in a few weeks. Frequent washing is thus required and the paint is soon removed requiring repainting. Obviously a semi-gloss is a more substantial surface. The texture is the most important factor in keeping down painting work and it has been proved that sand-finish walls will cut painting repairs at best in half. At the same time children will not draw on such surfaces. There also seems less tendency to touch the walls and if hands are placed on the walls no marks result. One of the most common materials used in the United States for walls where there is heavy traffic is American glazed wall units. In this country such surfaces cost so much more than sand finish well painted cement plaster that it is cheaper to repaint every seven years or so than pay the interest and amortization of the added first cost.

In washrooms the same arguments apply but here consideration must be given to the fact that liquid soap will bleach most paints in one year. It is good business to spend the money for glazed tile behind all washbasins. If rubber base enamel can be secured this will resist the action of strong alkalies and provide an inexpensive surface.

The gym walls are a large area that is effectively covered with brick or structural glazed block. Generally, contractors do not like this type of construction because it means bringing a finished trade into the building during the rough construction stage with resulting high costs. The remarks therefore about sand finish cement plaster naturally apply to gym walls and with attractive colour schemes using medium dark dadoes a good looking, inexpensive interior can be achieved. Basket balls will not mark such walls if a gloss enamel is used. The use of brick seems to give school interiors an institution look and when soiled they are almost impossible to clean.

Ceilings present little problem whether plain or sound absorbing. An economy can be effected in classrooms by using a sound absorbing material for pin-up space such as a half inch thick fireboard. This will reduce revibration so that plain plaster can be used for ceilings. For gym ceilings acoustic tile requires a solid backing.

Trim repainting can be reduced to a minimum by the use of other materials than wood. For instance a four inch rubber base will cost little more than wood, requires no painting or maintenance and will not be damaged from polishing machines. Asphalt base should be avoided as it is brittle. There is no dusting or maintenance of any kind. Door frames of metal are comparable in cost with wood and will not deteriorate with age. Paint will last on these indefinitely. Chalkboard trim can be made of aluminum but the added cost does not justify the use of this material as far as Canada is concerned.

Doors are now universally made of plywood so the finish is the only item for discussion. Not too light a glazing, stain with a sealer or binder and a wax finish is a life time job.

Where glass might get broken such as corridor partitions and panes in entrance doors it is an economy to specify unbreakable glass. This costs about the same as polished wired, looks better and is more serviceable.

Perhaps the greatest economy of maintenance is in the elimination of radiators. This can be accomplished by the use of forced warm air or by radiant heating. With the former, filters must be used to keep down dust and as these would require changing or cleaning once a month in a large city, the cost is considerable. Generally there is no initial saving in comparison with hot water heating. Radiant heating, however, costs at least no more, sometimes less than forced hot air or hot water with radiators and has no expensive filter problem. Both of these greatly lessen the janitors work as radiators are a headache to clean. If this is not done they provide a perfect place for germs to hibernate and when the heat goes on they take off sending a large number of the children home with sickness. There is a marked reduction in the soiling of walls due to air currents.

If a hot water system is used consideration should be given to the question of ease of cleaning radiators as already mentioned. Some radiators are very difficult, particularly cast iron connection type. Radiators permitting cleaning with vacuum cleaners without removing fronts are recommended.

Lighting fixtures can be selected that will cause trouble. Inverted bowl – "fly catchers" – are the worst, and flush concealed – "open bottom" the best. The new concentric ring, reflector base lamp units are the cheapest unit available and they give an excellent light. As these are incadescent lights the maintenance is much less than with fluorescent and more than offsets the extra power cost.

There are many more items naturally that could be mentioned but these are a few that have come to mind that is hoped have proved of interest and perhaps benefit.

W. W. CAUDILL and W. M. PENA

COLOUR IN THE CLASSROOM

IMAGINE YOURSELF waking up one morning to find that during your night's sleep you had lost your "colour vision" – your ability to determine the colour of any object, and to distinguish the differences in colour between one object and another! Imagine the drabness of your surroundings – the depression of spirits which would be likely to accompany life in an environment of blacks and whites only, of light and darkness, devoid of all the fullness and richness which colour imparts to our daily living!

More and more our modern life makes use of colour. In our homes and business houses, in our shops and cocktail bars, in our clothes and accessories, in our automobiles, in our various media of entertainment – in fact, in all phases of living, colour predominates. Today the science of colour harmony has, with other sciences, moved beyond the limits of the merely physical and embodies, in part at least, many elements of the psychological. Today the depressing drabness of off-browns, dull grays, leaden blues would not be tolerated in a housewife's kitchen or in a modern factory's shipping room. Today both business establishments and homes are scientifically "colour-engineered" to insure a maximum of physical and psychological well-being for their inhabitants. Yet the colour-environment of our school buildings – the environment to which we intrust our children during much of their most vital phases of development is all too often neglected.

In considering the effect of colour on the well-being of the school child, let us first consider the question: What *is* colour? The answer, although obvious, contains many important implications for school builders and planners. Colour is a *sensation,* similar in nature to smell, or sound. Light falls upon chemical substances such as paints, or objects such as leaves or tree trunks. These objects, in turn, are so constituted as to reflect some light rays and to absorb others. The reflected light is thus bounced or "refracted" onto the eye of the human being. Optic nerve centers are stimulated; a neuron transfer is made; and the brain "registers" the existence of the sensation which we call "colour" in terms of such definable specifics as "red," "green," "yellow," or "blue."

But colour is more than merely a sensation. It is a sensation which produces certain specific and measureable results. Just as the taste (or smell) of certain substances may cause the human being to experience pleasure, or to experience repulsion, so the sensation of colour may create feelings of pleasantness and harmony, of drabness and depression, or of stimulation and excitability. It is just this factor which causes colour to be of such importance in the classroom, for the classroom is the home – the environment – of the learning process. And when the atmosphere surrounding the learning process is harmonious and attractive, then the entire process itself is stimulated and aided. Conversely, dull and dispiriting surroundings of necessity hinder, and sometimes manage almost completely to destroy, the interest and enjoyment of the learner.

And it is the learner – the child – who is of primary importance in the classroom. The good school building is child-centered, designed to provide the most effective environment possible for the educational processes which go on in it, and to serve as a living aid to the processes – actually, a tool for learning. In both of these functions, colour must of necessity play an important part.

For children *like* colour! Far more than adults, children are colour-conscious. Consider the reaction of the tiniest of babies to gaily-coloured objects. Consider the favourite illustrations in your child's fairy-tale book, or in the books and magazines of your childhood – by far the majority of them employed rich, bold colouring. Toy manufacturers have demonstrated clearly the sale value of "warmly" coloured playthings – red, orange, and yellow balloons; red fire engines and sleighs and model automobiles and airplanes; bright yellow water toys; vivid orange-on-black bicycles. All through the child's growing years, colour plays a vital part – and in the classroom the colour should be engineered in a planned and orderly manner, to insure the happiness of the child, and to motivate him to positive reactions to the whole educational programme.

From the psychological standpoint, the colour engineer or the architect, in planning for the best use of colour in the school plant, must consider each area of the school building separately, as well as seeking to produce an attractive and harmonious whole. He must realize the fact that different functions of education are carried on in different areas, that different age-levels of children are housed and taught in different areas – and that no single colour scheme is desirable for all. Rich, warm colours tend to stimulate relatively strong reactions of the nerves, and hence lend themselves to areas designated for activities and recreations. Blues, greens, and aquamarines, on the other hand – the "cooler" colours – are more effective where contemplative effort is the order of the day. Bright reds and oranges appear to have the effect of "sharpening" perceptions, and are frequently useful along stairwells and corridors, and as safety factors in certain shop areas and laboratory areas. Harsh or glaring tones, or exotic combinations of colours, should be avoided in the schoolroom, however. For the chief overall value of colour in the educational process is to provide an environment which brings about a general mood of acceptance and enjoyment of the classroom situation.

For this purpose, the skilful use of colour has proved most effective. In schools that have used properly balanced colour and light schemes as contrasted to traditional situation, observers have noticed more alertness on the part of pupils, more teacher enthusiasm, less teacher fatigue at the end of the day, and more pride in the building on the part of pupils and staff, resulting in greater cleanliness and care. In the modern classroom, intelligent use of colour is essential for the prevention of an institution-like atmosphere which is the result of a monochromatic colour scheme.

Of course, care must be exercised in the selection of colours for school-building interiors, in order that proper lighting effects be secured. Lighting of desirable quality and quantity is a major tool of the educational process – and in selecting colours for the classroom, attention must be given to the sources and intensity of light, to the maintenance of appropriate brightness-differences, to special uses of specified colours for deliberately planned light variations. Colour properly employed renders important services in improving the quality of light, especially in the maintenance of appropriate brightness-difference. By studying light-reflecting values of various colour tones, the architect may select colours which will promote a maximum visual comfort for the children as well as provide a pleasing schoolroom atmosphere.

Proper colour for any given school area will depend in large part on the use of the area, and on the amount and kind of light cast upon it. Different types of light will impart different qualities to the same colour. Hence the problem of whether the school area is planned for the use primarily of daylight (with maximum or minimum of sunlight), incandescent light, or fluorescent light is of importance in considering possible colour combinations. And similarly, light qualities needed for contemplative activities such as study or drafting are not the same as those desired in areas in which more active learning processes, less demanding of acuity of vision, take place. Hence light blue-green and medium blue-green tones which, in areas using incandescent or fluorescent light, might provide satisfactory and attractive light qualities for study, would not be recommended for a music room or play area exposed primarily to daylight.

Whatever the colour combinations finally selected by the classroom designer, a final check on both quantity and quality of light should always be made before the colours are actually put into use. Several excellent books on these subjects are available, and in brief the agreed recommendations as to reflective factors required from classroom walls and ceilings call for reflection from ceilings to be approximately 80 to 85 per cent, from side walls approximately 60 per cent, and from wainscot trim and baseboard 40 to 60 per cent. Naturally there are variances allowable according to the need for sharp perception and other factors.

Perhaps more important than sheer quantity is the quality of the light reflected by the colours employed. Certainly for the younger children it is good general practice to use full, rich colours, even though some slight variance from commonly accepted standards of reflective value may result. Harmony of colour tone, too, tends to increase the value of light quality by eliminating sharp brightness-differences. Most of us can remember only too well the constant annoyance to our eyes created by old-fashioned classroom interiors in which a dark wood trim invariably appeared in direct association with white or ivory wall colours, and a harsh, glazed, glare-producing blackboard arrangement made us miserable for the large part of the day.

Today, classroom designers take more thought for the function of colour. Softer finished, high-visibility, relaxing greens may be used in blackboard construction. Warm oranges or yellows may be predominant in basement rooms such as shops. Ivory and tan combinations are found to provide excellent light-reflective values in laboratory areas, corridors, and stairwells. Peach and terra cotta blends are found stimulating and warm, and are in very satisfactory use in recreational rooms, lunch rooms, music rooms, and elementary and kindergarten-level classrooms. The architect of today keeps before him constantly the fact that *he is designing for children and for children's functions in the learning process.* And he attempts to select colours which will serve both the ends of providing proper light reflection and quality and of assuring psychologically pleasing surroundings.

Also the more thoughtful architect-designer makes use of materials which are at once structural and colourful. Too many so-called "experts" on colour presuppose that the colours will of necessity come in cans of paint to be applied to walls and ceiling, floor and trim of the classroom. Often they take the position that walls and ceiling must be constructed of materials which *must* be painted, such as plaster. Yet it is obvious that the classroom allows for the use of many desirable structural materials such as brick, natural woods, plywoods, glass, or tile – all of which have their own colouring, and may hence serve both colour and structural functions.

The problem of colour in the classroom, then, involves far more than merely "picking out" one colour or another to paint walls or ceiling with. It involves a thorough study of the educational processes to be carried on within the given classroom area. It involves consideration primarily of the children themselves, of their age-levels, their activities, their classroom equipment and decorations. It involves appreciation for structural materials available to provide desirable colour variations. It involves knowledge of the fields of colour harmony, light and colour, colour psychology, balance and design. All these abilities the architect-designer must bring into play in creating in today's classroom an atmosphere which will truly further the well-being of the child and stimulate in him a liking for and a receptivity to the learning process.

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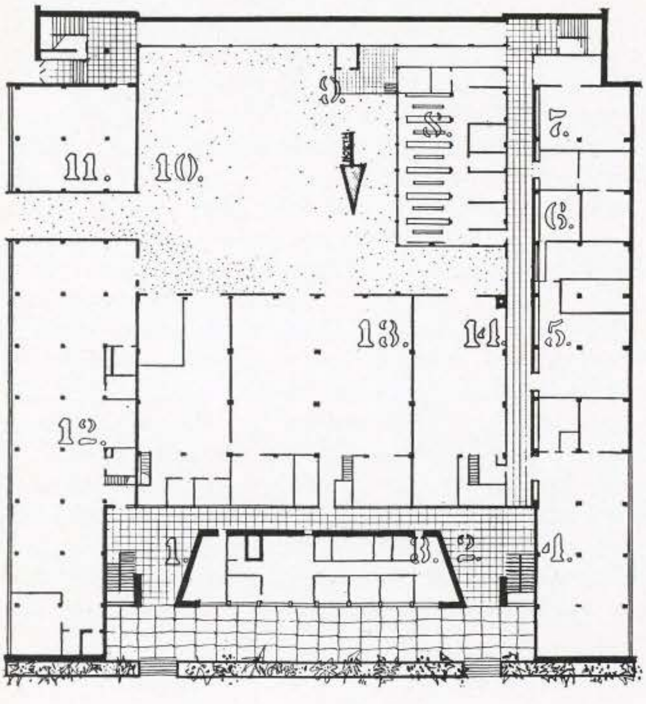
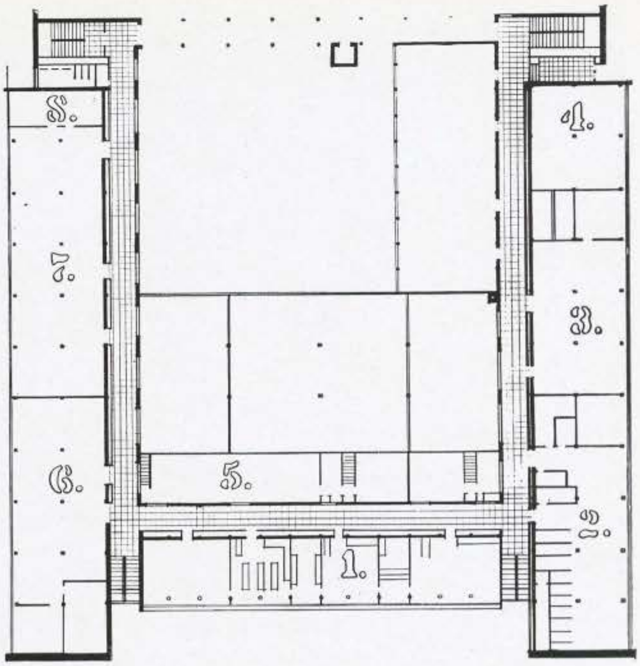


GROUND FLOOR

1. & 2. Entrance Lobbys
3. Administration
4. Machine Shop
5. Boiler Room
6. Electrical Rooms
7. Storage
8. Locker Rooms
9. Receiving Elevator
10. Parking Court
11. Barber Shop
12. Woodworking
13. Motor Mechanic Shops
14. Diesel and Steam Shops

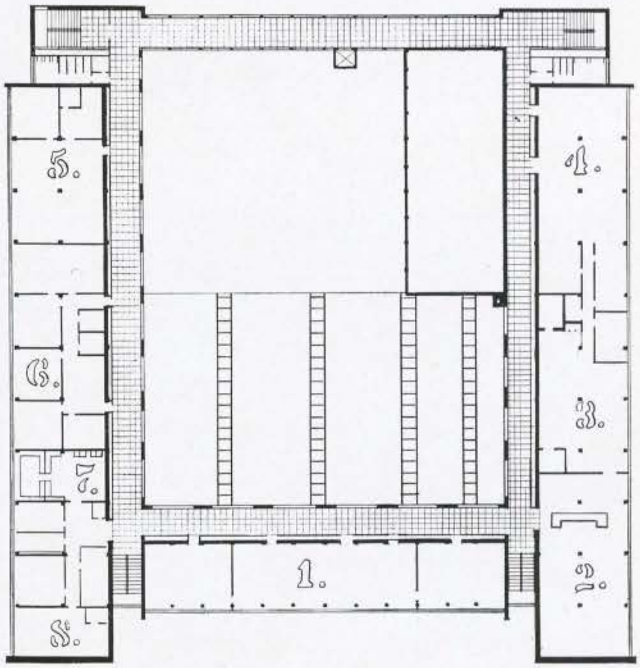
1. Chemistry and Physics Labs.
2. Welding Shops
3. Plumbing
4. Refrigeration
5. Motor Mechanics Classrooms
6. Electrical Shops
7. Building Services
8. Shoe Repair

1st FLOOR



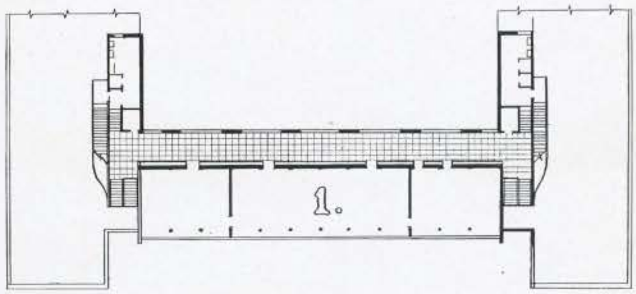
1. Classrooms
2. Dining Room
3. Training Kitchens
4. Cafeteria
5. Watch Repair
6. Office Practice
7. Home Economics
8. Nursing Wards

2nd FLOOR

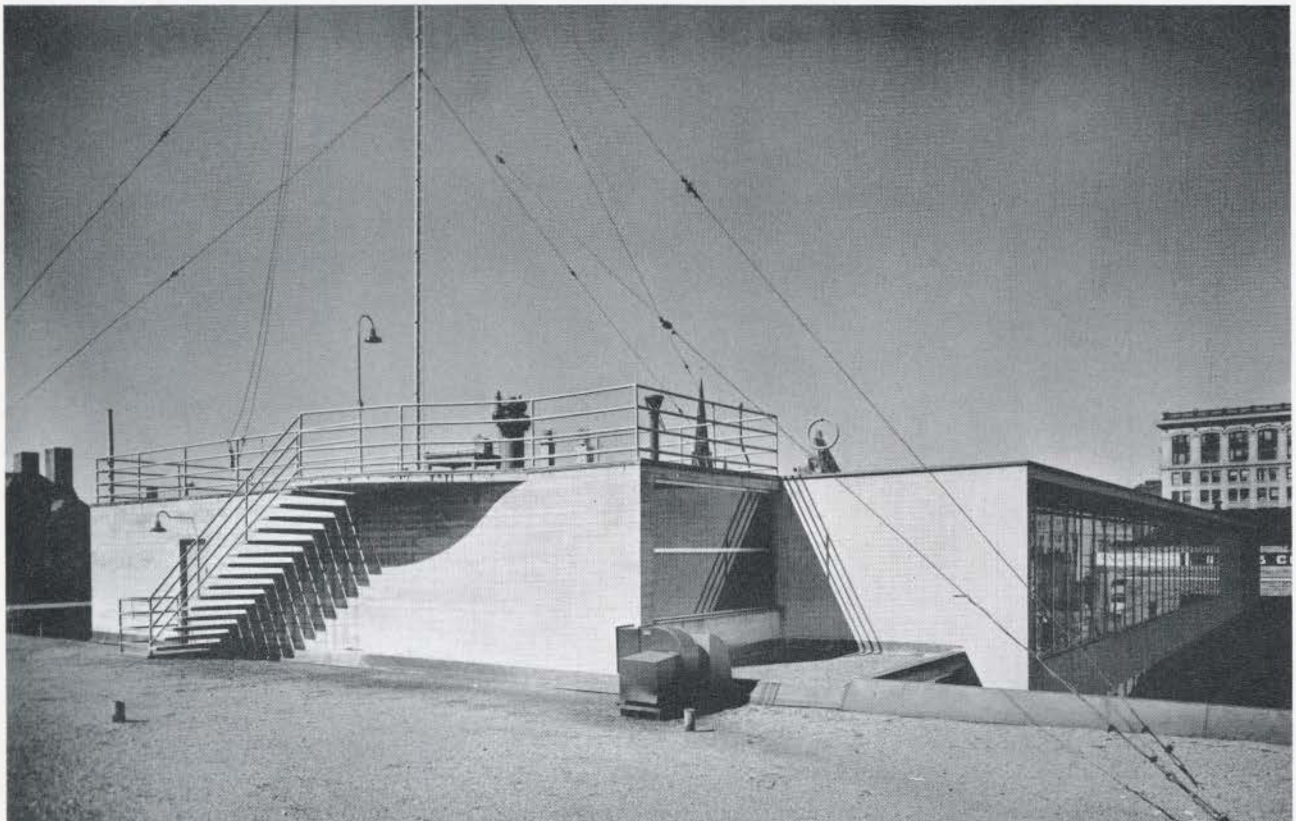


1. Navigation and Radar Classrooms

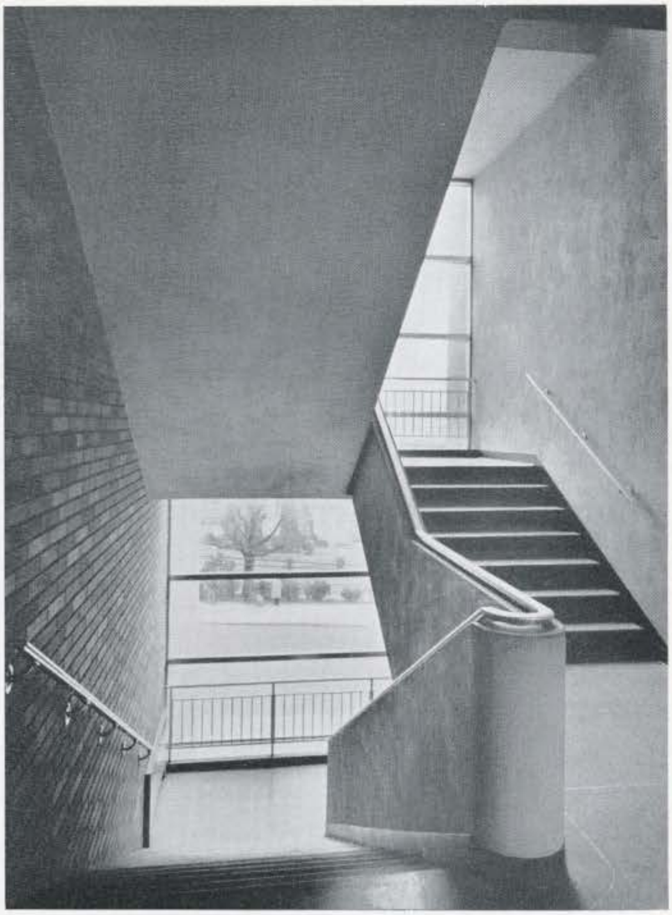
3rd FLOOR



STAIR TO NAVIGATION BRIDGE

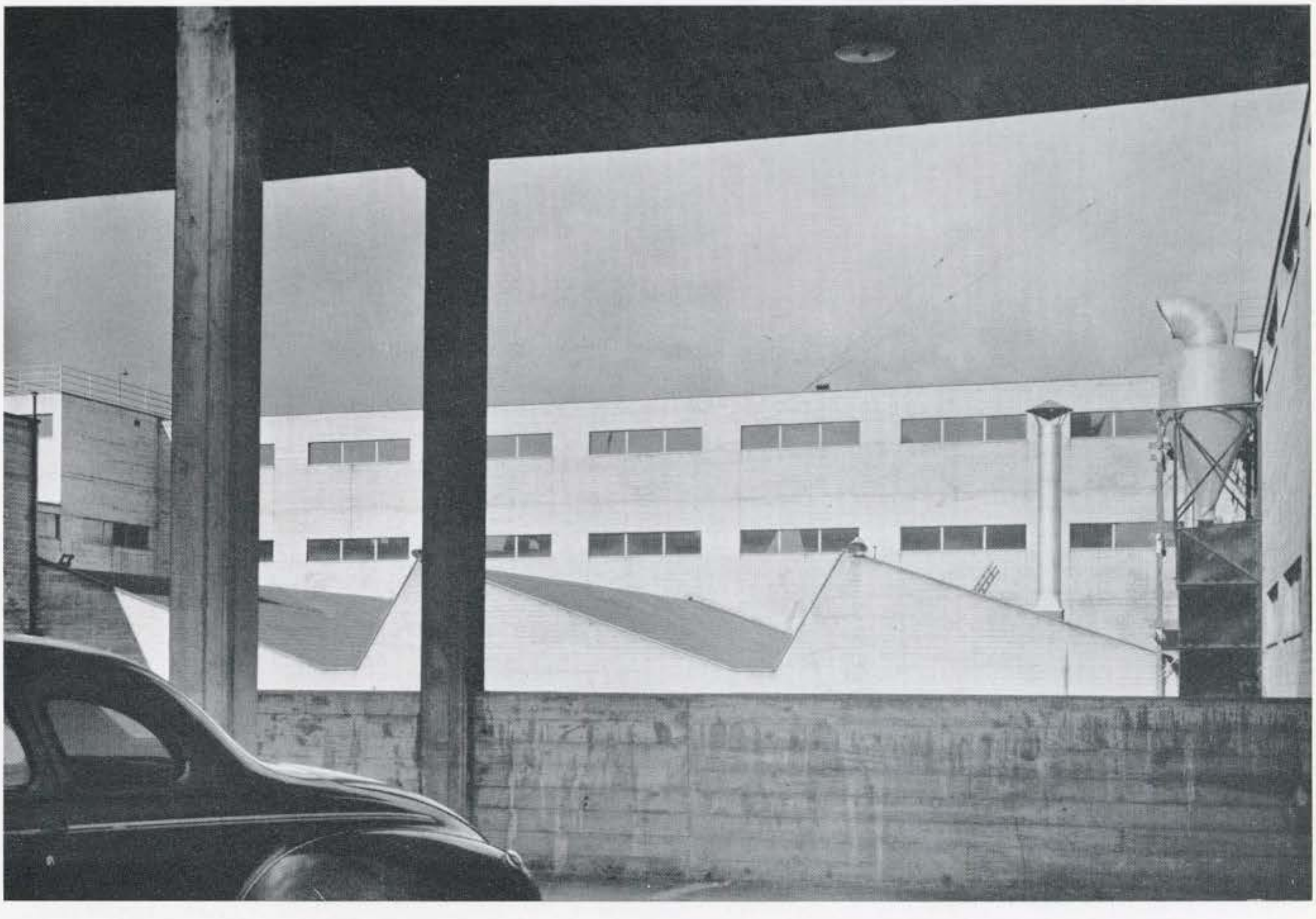


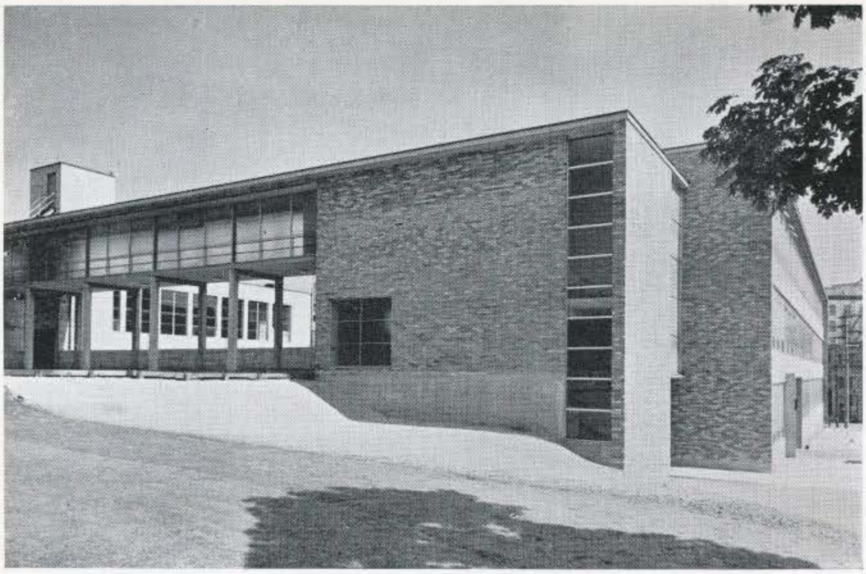
PETER VARLEY



MAIN ENTRANCE STAIR

VIEW OF INNER COURT FROM UNDER GALLERY





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PETER VARLEY

CONNECTING GALLERY 2nd FLOOR

PETER VARLEY

E. CORRIDOR 2nd FLOOR

FRANCIS G. REED

SCHOOL LIGHTING

The science and practice of the illumination of school classrooms has been a subject for much study by school officials, their architects, and particularly their lighting engineers. The bibliography of articles and books produced within the last fifteen years is quite formidable Extensive practical tests have been made, some independent authorities, some sponsored by commercial interests. All these have contributed substantially to the body of scientific knowledge. We now look for simple conclusions, usable data, and reasonable specifications that will ensure adequate results in the form of visual benefits in the classroom.

So far the results don't look too simple, and those who are hoping for rule-of-thumb procedures may be disappointed. We can only say that there has emerged a limited variety of practical lighting methods, both natural and artificial, and that these are each hedged with their own special restrictions depending upon the many variables that surround them. It is encouraging to know that virtually all of the researchers find themselves to be in comparative harmony, at least on fundamentals.

Before launching into a discussion of the techniques of classroom lighting by both natural and artificial means, let us look briefly at the objective – *to produce a comfortable visual environment for the relatively severe and prolonged seeing tasks of the classroom.*

Objectives

(a) Quantity

How much light is enough? There is no simple direct answer to this because seeing benefits accrue at much higher levels than may be economically attained. As the illumination level is raised from zero the eye-benefit curve rises very rapidly, then flattens out according to the law of diminishing returns. Up to 30 or 40 foot-candles the improvement under increasing illumination is quite pronounced (see Fig. 1), and it continues at a relatively lower rate well past 100 foot-candles. The recommended level of illumination therefore cannot be an optimum but rather one influenced by the practical consideration of cost. The School Lighting Committee of the Illuminating Engineering Society in 1947 proposed a minimum level of 30 foot-candles for ordinary classrooms (see Table I). This was approved in 1948 by the AIA and the American Standards Association. The Committee, incidentally, was composed of nineteen members: two architects, two consulting engineers, three university department heads, a state education department, two board of education representatives (including one from Toronto), a sight conservation bureau, four utility engineers (including the Ontario Hydro), and four representatives of industries.

The Ontario Department of Education now recommends 20 to 30 foot-candles minimum. The general practice in applying this standard is to use the higher level for new schools and alterations to older urban schools, the lower for alterations to all small rural schools.

(b) Quality

So much for quantity. The matter of quality is another thing, and not as readily specified; yet it is a factor of utmost significance in classroom lighting. Doubtless all readers have heard this discussed under the involved title of "distribution of brightness in the visual field." Simply, the aim is to minimize brightness contrasts. Obvious brightness contrasts are recognized as "glare" and easily avoided because recognized. More subtle contrasts if persistent may also have a deleterious effect, sometimes not limited to the eyes alone but to general health and physical and mental development.

To avoid a technical discourse and yet give some usable data we may summarize the recommendations for brightness control by stating relative brightness ratios that are considered allowable in classrooms. These are set out in Table II. But what specifications will ensure these results? Obviously these: specifications relating to the brightness of window areas and luminaires, and the reflectances of ceilings, walls, chalkboards, tackboards, desk tops, and floors. Fig. 2 illustrates the recommended surface reflectances which, in combination with proper luminaires, will produce good brightness ratios. The writer believes that classroom colour schemes can be made to meet the specifications shown in Fig. 2 without seriously limiting the designer. They allow full liberty in both hue and saturation, and reasonable liberty in value.

Methods

(a) Daylighting

In most classrooms daylight is the primary light source. It is therefore reasonable to seek a means of using it to utmost advantage. Several methods have been employed to introduce a greater quantity of daylight into the classroom. Sometimes these devices have been highly successful, sometimes of doubtful value, and sometimes an expensive disappointment. In the latter instances the fault may not be in the basic methods used, but in the manner and circumstances in which they were employed.

Most of our ideas on this matter, and our subsequent practice, have developed out of new design concepts employed by architects in California and Texas under the inspiration of Dr Bursch (California State Division of Schoolhouse Planning) and Dr Harmon (Texas State Department of Health). These new design concepts include a variety of devices to introduce daylight into the classroom: bi-lateral lighting, light-directing glass block, roof monitors, exterior projections, interior and exterior louvres, and the like. The results achieved have been carefully investigated and tabulated. On the whole, though certainly not without exception, they were good *for that latitude and climate.*

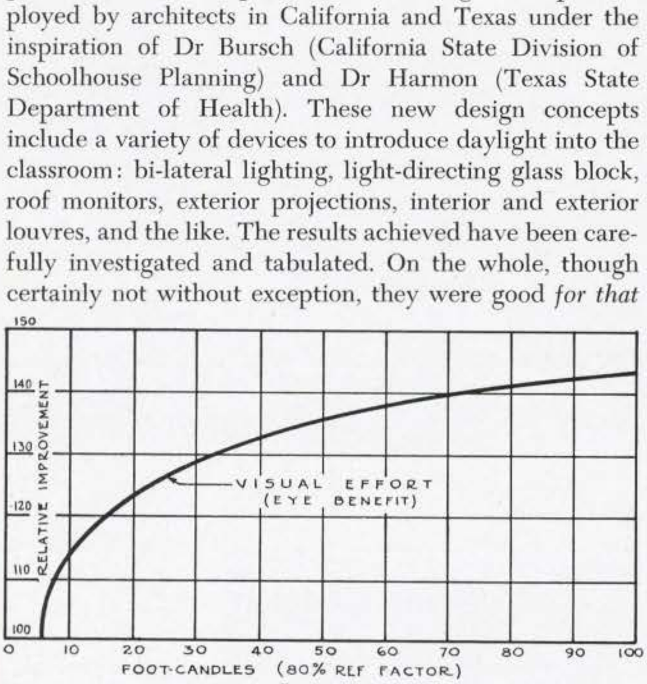


FIGURE 1
The curve summarizes the results of several investigations involving the visual recognition of test objects.

Our Canadian architects, or perhaps rather their clients, have sought to emulate these southern examples, sometimes with little regard for the altered geographical circumstances. Some of these southern classrooms have been deposited on Canadian soil with no attempt to critically analyse the conditions that made them satisfactory in their natural habitat.

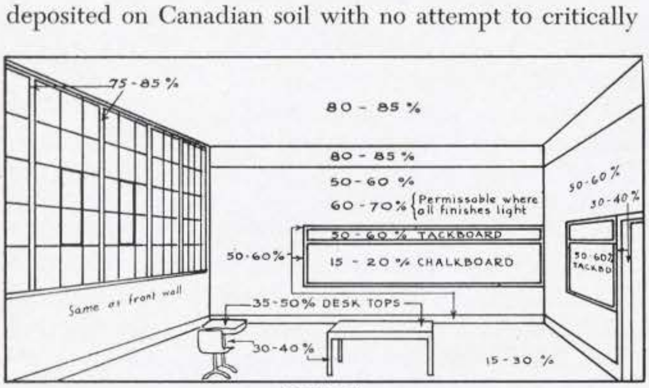


FIGURE 2
Reflection factors desirable for classroom surfaces.

We are not prepared to set down here proposals for adapting them to our use nor are we able to propose new design concepts that might adequately meet our conditions. The fact of the matter is, no engineer or architect is in a position to point the way in this regard until adequate studies have been carried out to a sufficient extent to indicate procedures likely to be fruitful. Cursory field checks of quantity and quality of daylight illumination in the contemporary style of classroom have been made by the writer. The results are sufficiently good to indicate that these new designs have possibilities, and sufficiently bad to indicate that more factual data is needed for the guidance of designers.

At the request of the Ontario Department of Education, the Research Division of the Ontario Hydro is now undertaking a thorough study of this subject. The Department has indicated that it desires research in the whole field of classroom visual environment, including both daylighting and artificial lighting in classrooms of traditional and contemporary design. The project will require a year or more to complete.

In the case of the traditional style of classroom, enough is already known to indicate suitable specifications for maximum daylighting with good brightness control:

1. Prohibit the introduction of direct sunlight by orientation so that the major window area of the room faces that portion of the sky that has the most uniform light. Therefore the main windows of the classroom should face north. An eastern exposure may be used as second choice if a louvred awning or roof exterior is incorporated in the building to shade the windows from direct sunlight.
2. Windows should begin at a point three and a half feet from the floor and continue clear to the ceiling, and should extend the entire length of the room. The elimination of the blank section of the window wall at the front of the room is desirable, for its presence puts the front chalkboard in comparative darkness.

   Ordinarily when windows occupy so much of the outside wall, classrooms with northern or eastern exposures have no appreciable veiling glare on the blackboard. If smaller window areas or different exposures are used so that veiling glare is present on the front chalkboard, louvering the front window to reflect the light to the ceiling will eliminate glare.

   Discomfort occurs whenever intense light can enter the eye at angles below the normal line of sight. Windows three and a half feet from the floor are above the direct line of sight for a child seated, but permit him to see outside when standing.

   Tests have proved that the light entering the room from the top of the window is the most effective. The inside row of desks receives 41 per cent of the illumination from the upper *quarter* of the window. Therefore glass should extend as close to the ceiling as possible. If the construction method will permit the elimination of practically all of the header, so much the better.

   Mullions should be as narrow as possible. In warmer climates it is feasible to use steel sash and frames, and so reduce mullion space to the minimum. Where that is not feasible, other means should be used to reduce the size of glass interruptions.
3. Proper desk arrangement is a key factor in the classroom visual environment. The recommended pattern for a unilaterally lighted room is obtained by drawing a line diagonally across the room at 50° with the window wall, originating at the front of the first window. All desks in front of this line should be faced straight ahead, with the line of sight parallel to the window wall. All desks behind the line should be faced so that the line of sight makes an angle of 50° with a line drawn from each desk to the front of the first window.

(b) Artificial Lighting

According to the Ontario meteorological records 60 per cent of all school days are "dark" days. In spite of all efforts to get daylight into the classroom there are times when its value on the desks at the right side of the room is as low as 5 foot-candles. We have made tests of classrooms employing bi-lateral lighting with clear glass and also of rooms with light-directing glass block fenestration, and in certain cases have found the light level at the inside row of desks to be less than 5 foot-candles. This was with a heavily overcast sky, but with no smoke or dust in the atmosphere.

A specification for a 30 foot-candle minimum level means of course *combined* natural and artificial illumination. The amount of natural lighting, however, is an unpredictable quantity. If we were certain to have as much as 15 foot-candles of daylight on the inside row of desks at all times then we could meet the requirements by designing a lighting system to add a further and equal amount. But we know from experience that we cannot be sure of the natural lighting. Add to this fact the possibility that some classrooms may be used at night for educational or community purposes, and the conclusion is that the artificial lighting system should be able to meet the full requirements *whenever necessary*. If the system is designed to be flexible then it will be possible to use only what is needed at any given time.

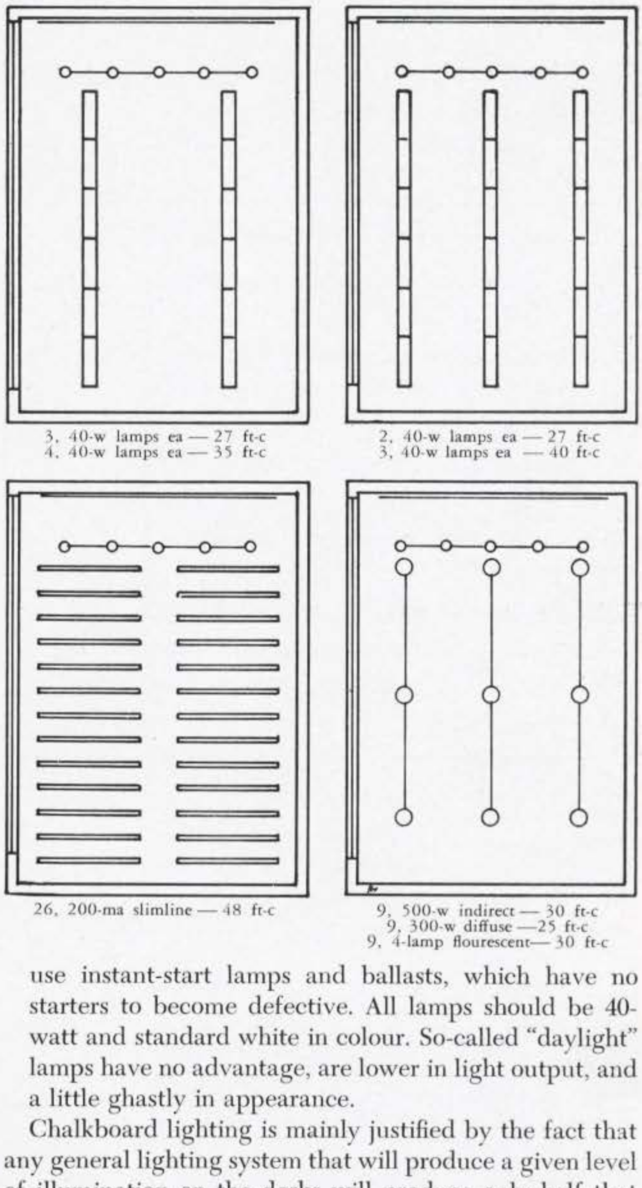
Where financial considerations prohibit a complete system it is suggested that the complete wiring be installed, with luminaires for only the dark side of the room where it is certain that night classes will not be held. To install two rows of luminaires (three units each) in a three-row system is perfectly feasible. To install one row of a two-row system, however, is inadequate; for in the first place a two-row system of six units can deliver scarcely 20 foot-candles of illumination.

Fig. 3 illustrates a few typical luminaire layouts, with details of type and resulting illumination levels noted.

Fixture or luminaire types for the classroom are subject to more restrictions regarding allowable surface brightness than are those used for most other purposes. There are three main types, the first two being incandescent (that is, filament lamps) and the third fluorescent (gaseous discharge). They are:

1. *General Diffuse.* This is enclosing glassware. Its surface brightness exceeds the recommended values for classroom lighting, but because of its low cost it is still tolerated provided it may be mounted not lower than 11 feet from the floor. Opal globes for either 300-watt or 500-watt lamps should be not less than 18 inches in diameter.
2. *Indirect.* This type uses the ceiling as a secondary light source, therefore the ceiling must have a matte white surface with a reflection factor of not less than 85 per cent, and it must be maintained so. Indirect luminaires are quickly affected in efficiency by dust, and must be kept clean constantly. The "silver-bowl" type is less affected than are other types and requires a little less maintenance.
3. *Fluorescent, Semi-Direct.* These may be open, or enclosed by diffusing glass or plastic. If open, they should be louvred or shielded so that bare lamps are not seen at normal viewing angles. They should be suspended about 10 feet from the floor. For very low ceilings they may still be employed provided the side panels are not too bright. Where mounted low it is usually best to employ the type having all four lamps in a horizontal plane rather than in a U shape, as this minimizes side panel brightness. Louvred industrial fixtures or "troffers" may sometimes be recessed between the joists to produce very effective illumination for low-ceiling basement classrooms. Fluorescent light has no more harmful effects than any other kind and, contrary to some reports, the fluorescent powder from broken lamps is not poisonous to the skin. In rural schools where maintenance is a somewhat casual matter it is advisable to

FIGURE 3
Typical lighting plans for a classroom 23 x 32 and 12 feet high.



3, 40-w lamps ea — 27 ft-c
4, 40-w lamps ea — 35 ft-c

2, 40-w lamps ea — 27 ft-c
3, 40-w lamps ea — 40 ft-c

26, 200-ma slimline — 48 ft-c

9, 500-w indirect — 30 ft-c
9, 300-w diffuse — 25 ft-c
9, 4-lamp flourescent — 30 ft-c

use instant-start lamps and ballasts, which have no starters to become defective. All lamps should be 40-watt and standard white in colour. So-called "daylight" lamps have no advantage, are lower in light output, and a little ghastly in appearance.

Chalkboard lighting is mainly justified by the fact that any general lighting system that will produce a given level of illumination on the desks will produce only half that amount on the vertical or near-vertical surface of the chalkboard. Supplementary lighting is therefore required.

The most effective system, that is the one delivering the greatest amount of illumination for the lowest power consumption, is one consisting of the reflector or projector type lamps. The equipment which holds the lamps (sockets, fittings, etc.) may be fully exposed for especially low-cost installations, or it may be surface mounted with concealed wiring, or it may be fully recessed flush with the ceiling and concealed by louvres. Where 150-watt projector-flood or reflector-flood lamps are used they should be aimed at an angle of 25° to 27° from the vertical, spaced approximately four feet apart, and the distance from the front wall should be approximately .70 of the height from the horizontal centre of the chalkboard to the ceiling.

Other types of equipment involve the use of prismatic lens plates or silvered glass reflectors. Information about these and costs can be obtained from reputable electric equipment distributors. These units must be installed according to the manufacturers' printed instructions.

In all cases it is essential to obtain units that will be rigid when installed so that they can not be put out of correct adjustment during replacement of lamps or cleaning. Ordinary clamping devices are seldom satisfactory.

The *American Standard Practice for School Lighting 1948* is a very safe guide for the lighting of classrooms by both natural and artificial means, with this reservation – that we have yet to learn more about daylighting in our latitude and climate. It is hoped that the studies currently undertaken by the Hydro's lighting research group will produce data that will be translated into reasonable specifications for the guidance of designers.

TABLE I

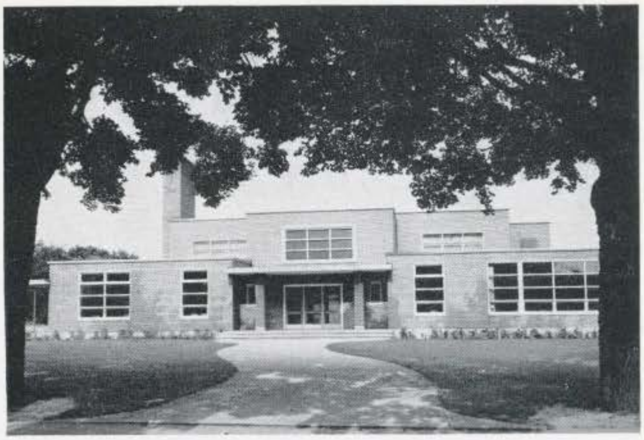
Lighting Levels at the Work (Maintained after Depreciation), Current Recommended Practice

LOCATIONS	Minimum Footcandles
Classrooms – on desks and chalkboards	30
Study halls, lecture rooms, art rooms, offices, libraries, shops and laboratories	30
Classrooms for partially seeing pupils and those requiring lip reading – on desks and chalkboards	50
Drafting rooms, typing rooms and sewing rooms	50
Reception rooms, gymnasiums and swimming rooms	20
Auditoriums (not for study), cafeterias, locker rooms, washrooms, corridors containing lockers, stairways	10
Open corridors and store rooms	5

TABLE II

Recommendations for Limits of Brightness Ratios in Schoolrooms

LOCATIONS	Ratio
a. Between the "central visual field" (the seeing task) and immediately adjacent surfaces, such as between task and desk top, with the task the brighter surface	1 to 1/3
b. Between the "central visual field" (task) and more remote darker surfaces in the "surrounding visual field," such as between task and floor	1 to 1/10
c. Between the "central visual field" (task) and the more remote brighter surfaces in the "surrounding visual field," such as between task and ceiling	1 to 10
d. Between luminaires or windows and surfaces adjacent to them in the visual fields	20 to 1

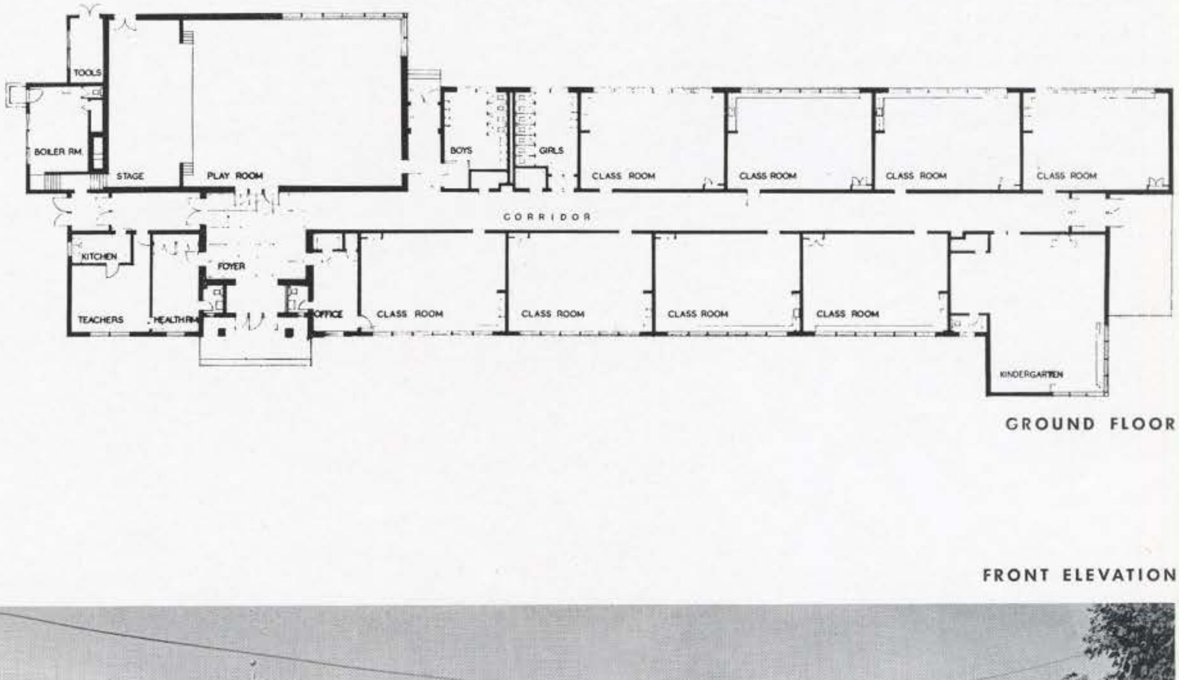


MAIN ENTRANCE

LINCOLN AVENUE SCHOOL, GALT, ONTARIO

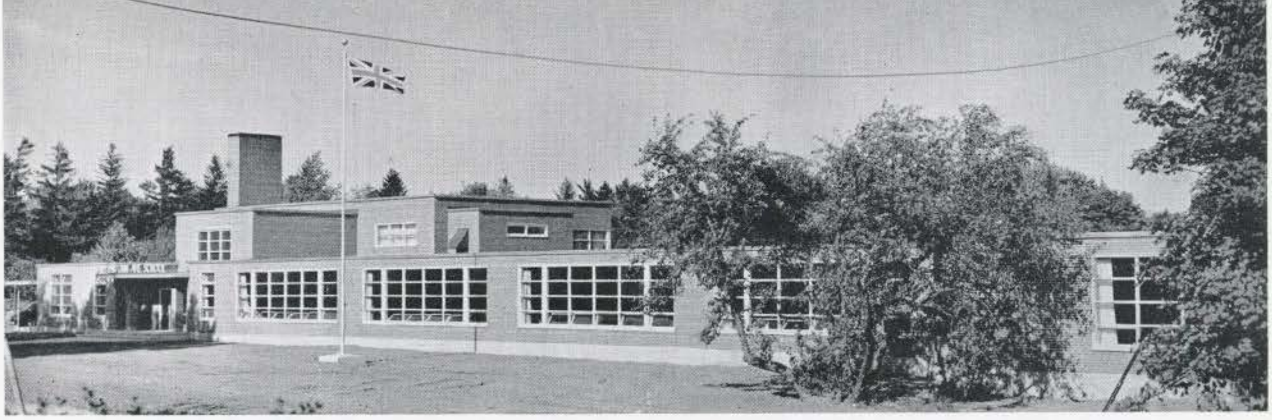
PAGE & STEELE, ARCHITECTS

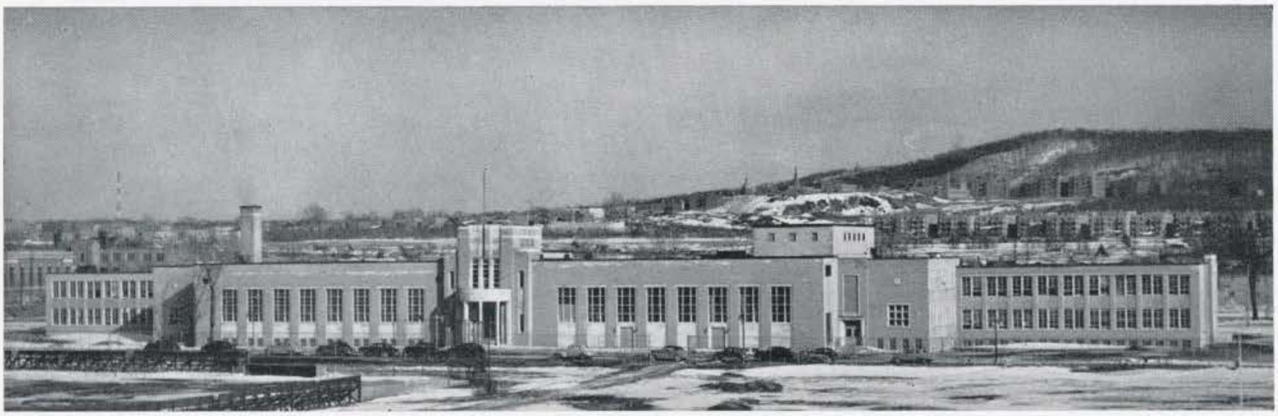
Wallace, Carruthers & Associates Ltd, Structural Engineers
Karel R. Rybka, Mechanical Engineer
E. L. Dodington, Electrical Engineer
Ball Bros Ltd, General Contractors



GROUND FLOOR

FRONT ELEVATION





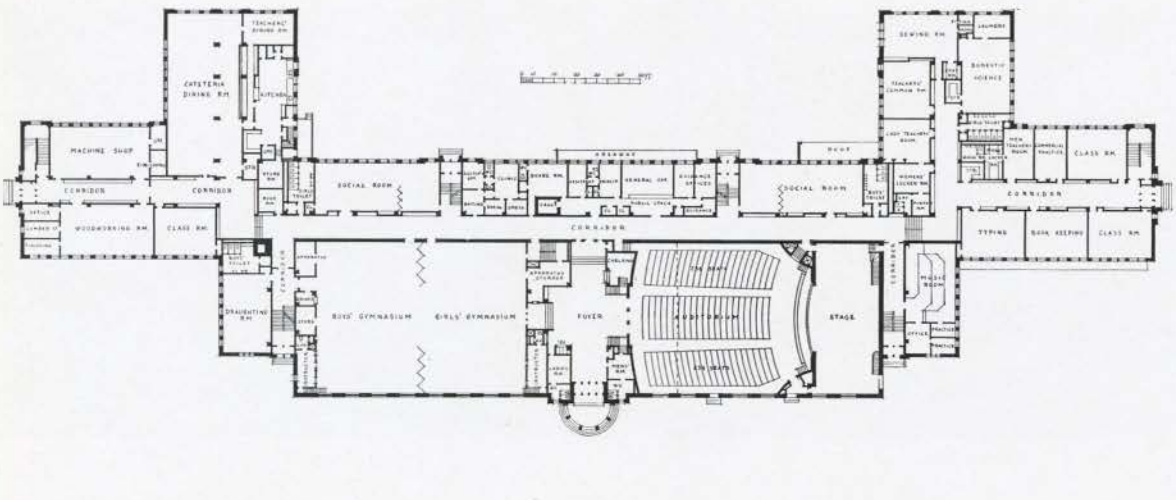
FRONT ELEVATION

MOUNT ROYAL HIGH SCHOOL, MOUNT ROYAL, QUEBEC

RANDOLPH C. BETTS, ARCHITECT, A. LESLIE PERRY, ASSOCIATE ARCHITECT

McDougall & Friedman, Consulting Mechanical Engineers
Pentagon Construction Co. Ltd, General Contractors

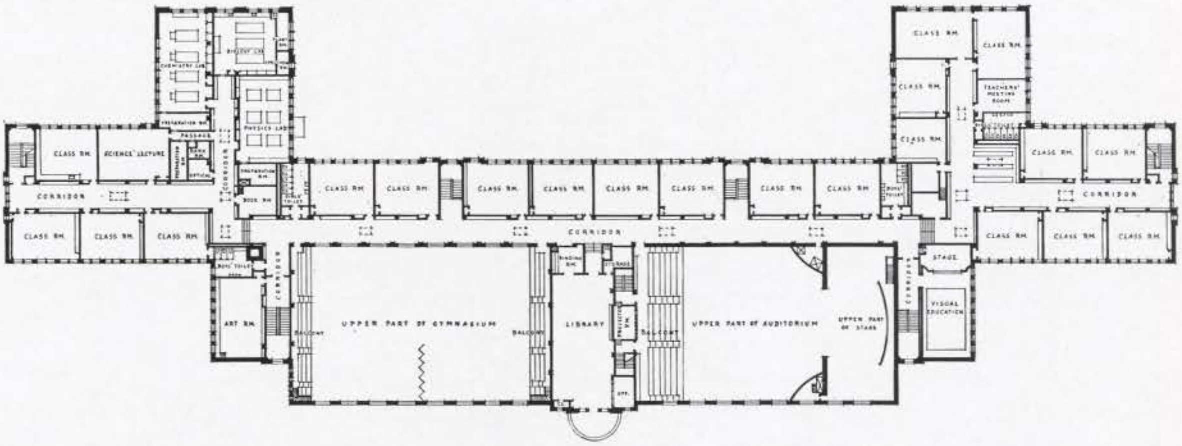
GROUND FLOOR

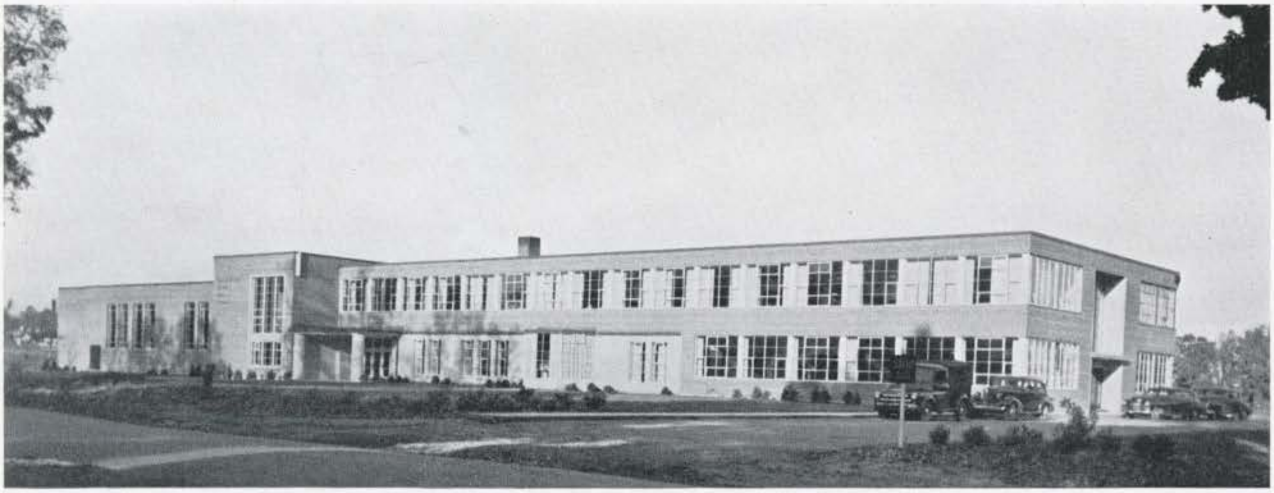


HAYWARD STUDIOS

MAIN ENTRANCE TOWER

1st FLOOR



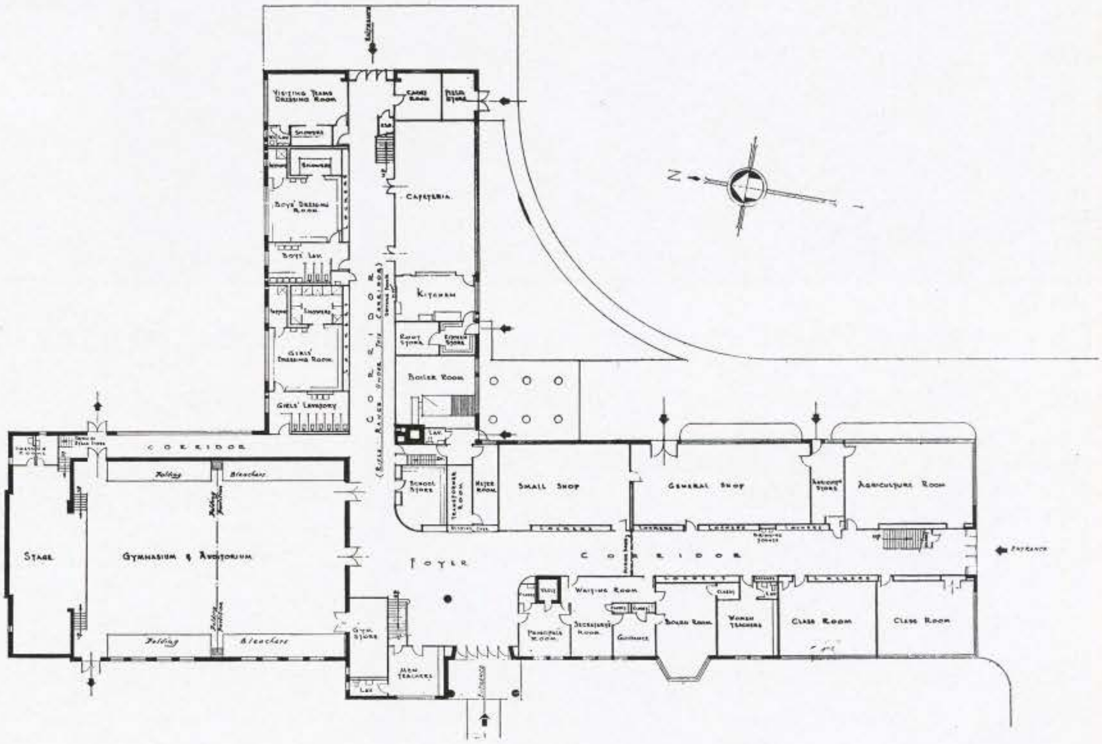


FRONT ELEVATION

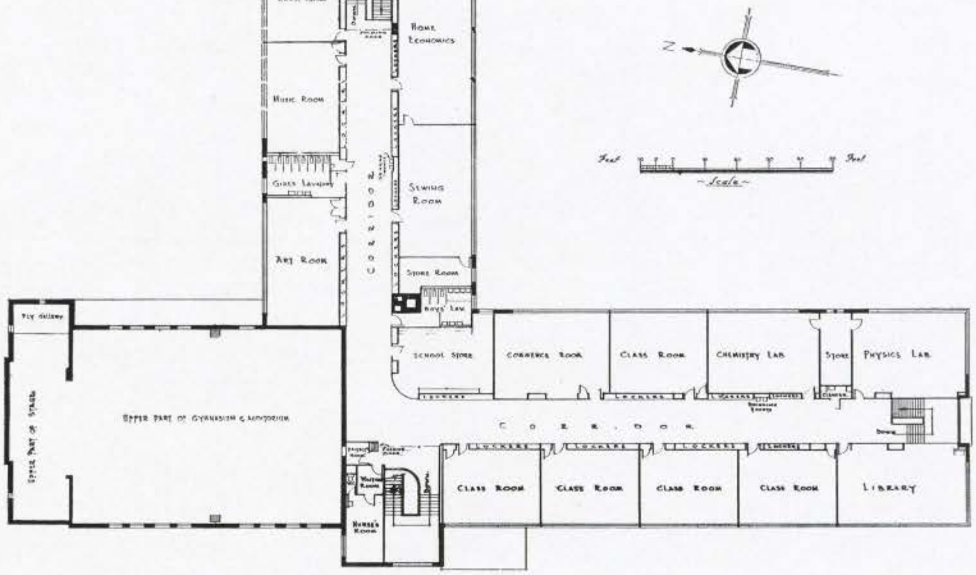
TILLSONBURG DISTRICT HIGH SCHOOL, TILLSONBURG

S. B. COON & SON, ARCHITECTS

The Foundation Co. of Ontario Ltd, General Contractors
Wallace, Carruthers & Associates Ltd, Structural Engineers
Fred Stott, Mechanical Engineer



1st FLOOR



2nd FLOOR

GORDON RICE

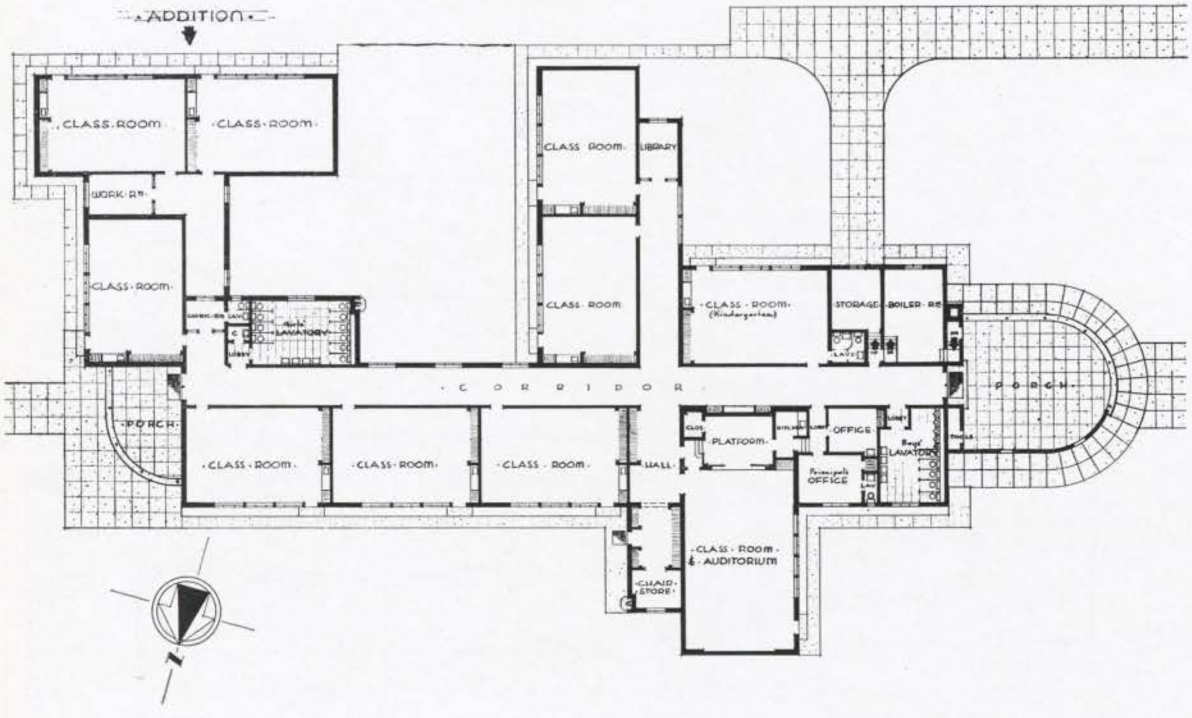
N. ELEVATION

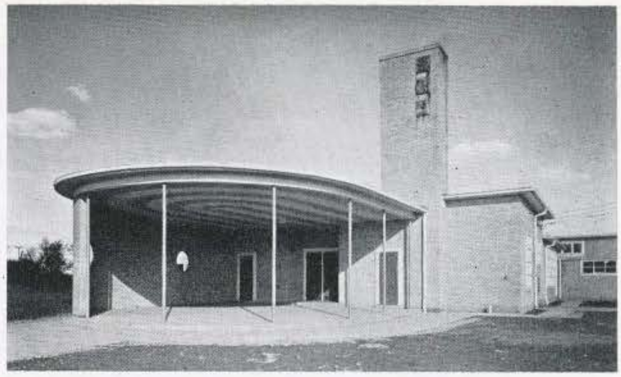
J. G. WORKMAN PUBLIC SCHOOL, SCARBOROUGH, ONTARIO

MURRAY BROWN & ELTON, ARCHITECTS

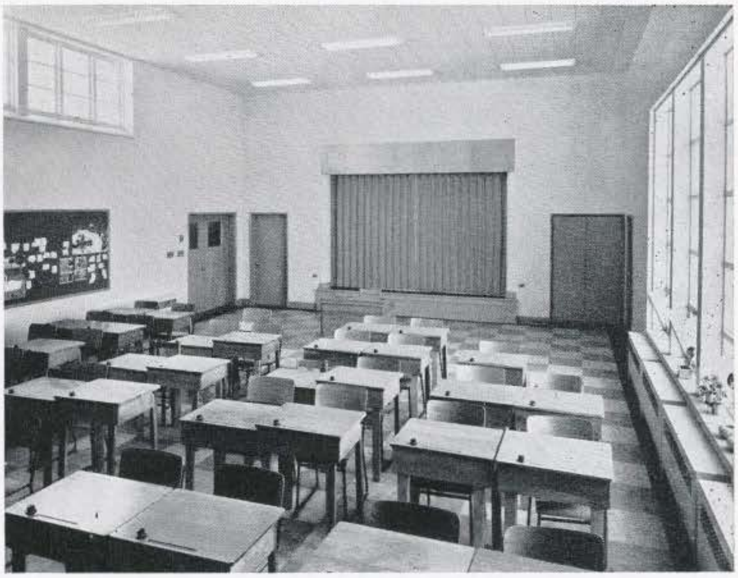
Wallace, Carruthers & Associates Ltd, Structural Engineers
S. M. Peterkin Co. Ltd, Mechanical Engineers
Stowe & Gould, General Contractors

GROUND FLOOR

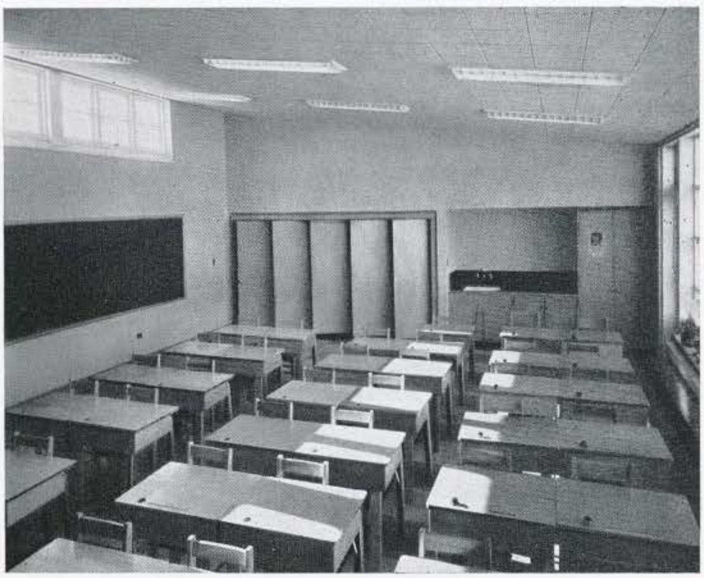




TWO VIEWS OF PORCH



AUDITORIUM CLASS ROOM



CLASS ROOM

JOHN H. BONNICK

THE POST-WAR SCHOOL PROGRAMME IN ENGLAND

THE FOLLOWING is a portion of an original report based on a survey made this past summer on the post-war school building programme in England. Beside extensive field trips and discussions with the County Architectural offices at the City of Coventry and counties of Lancashire, Essex and Hertfordshire, considerable research was carried out at the library of the RIBA. To the many who were both encouraging and co-operative I am greatly indebted.

The problems confronting school architects in England's post-war era were essentially threefold. With the majority of existing buildings quite inadequate and below the required technical proficiency there arose a great demand for new schools. Yet, in the national picture the primary post-war construction need was for homes. Thus it was inevitable that the greater majority of building labour available would be employed in erecting houses – not schools. Another factor which aided the turn of tide came in the year 1944, when Parliament approved the New Education Act. Here, in quite detailed form, has been set the standard of requirements to be incorporated in all future schools. It was, in reality, a yardstick against which all subsequent schools have been measured. Coupled with both factors is the influence of the client – the child. As Alfred Roth so aptly puts it "the child is the focal point of all school building problems, and around him should gravitate all considerations of education, town planning and architecture."

Such, in brief were the basic problems – the solution was yet to come.

Almost immediately, the various County Architectural offices were delegated complete charge in dealing with the particular educational problems of the areas to which they served. As such, nearly all the school buildings erected in England to-day are by these groups. Where a private architect has been commissioned a building, he is usually under the direct jurisdiction of the county architect.

Once the basic administrative machinery began operating, research was immediately carried out by the various groups as to the best type of construction. The insecure material problem carried great influence in this respect. The two systems – prefabrication of units and traditional building methods were exploited, and in the majority of cases, prefabrication was the final solution. Of the four counties covered in the study tour, three employed a prefabricated structural system.

Next came the all-important factor – architectural design. For the child, the school building is the starting point on the road to aesthetic appreciation. The importance of good design cannot be overemphasized. The British Architects are not consciously concerned with trying to create a new style in school design. Rather, their aim has been to provide buildings which, within the complex limiting factors of sites, money and material available, furnish the best equipped and arranged accommodation for current educational activities. "They have used modern structural engineering technique, contemporary materials and apparatus and the most recently formulated knowledge in science, sociology, child psychology, hygiene, planning and organization of the building. Their architecture grows out of the solution to these problems, inexorably and unalterably from the main massing and grouping down to the most trivial details. The building is an organic creation growing out of practical considerations. They have no preconceived ideas of what their buildings "ought" to look like, but select, modify and transpose the practical elements of their designs to form a pleasing and satisfying composition."*

Generally, there is a certain visual pleasantness and lightness about the work. Often a dash of elegance has been introduced. Materials like steel, aluminium and reinforced concrete, have aided in decreasing the need for heavy structural members and made possible a new sense of freedom and space. All buildings are well lighted, well ventilated. This would obviously create an admirable effect on the children. Elevations have generally been kept simple in treatment and walls are but mere protective shells, glazed or opaque as required. Flat or gently sloping roofs have largely replaced the traditional steep roofs of slate and tile.

The long, low classroom blocks, broken only by an occasional vertical emphasis of dominating mass (assembly hall, gymnasium or water tower) fit quietly into the pattern of the modern community in a neighbourly manner. Although little landscaping has as yet been executed, it is the hope that free shapes of trees and planting will help to blend the more formal lines of the building with the landscape.

Yet, the schools so far mentioned are hardly the ultimate. They are too sterile. Architecturally, they are too geometrical in concept and require more "loosening up" of the various elements. Where a brilliant effect has been achieved in one building, it has been incorporated into all subsequent designs. Thus, though the various architects

* New Schools Book issued by the RIBA.

advocate most strongly the predominance of individuality of design, the overall concepts do not always appear this way. This is, to a large extent, quite unavoidable due to the standardization of both material and structure. Here was a necessity – not a choice.

Planning

Judging from the schools visited, whose examples no doubt are closely followed in other parts of the country, the following are the main factors that resulted in a new trend in English Schools.

1. The admission of sunlight and standards of daylighting set for all classrooms.
2. Division of units in relationship to noises.
3. Introduction of a general purpose room where physical education may be practiced.
4. Meals are served to all children at noon hour.
5. The utilization of the assembly hall for music, theatricals and cinemas, as well as by the adult community.
6. The adoption of a module (usually 8 foot, 3 inch) in all planning.
7. Multi-purpose aspect of all classrooms.

Coupled with the above, one must realize that England was one of the first countries to realize that the one-storey school consisting of a number of loosely connected parts is much better suited to the requirements of modern education than the traditionally concentrated multi-storey school. Also, one should note that the new building regulations of 1944, especially those covering daylighting are virtually enforcing a single storey plan. All schools visited, save three (all secondary schools) were of the one floor type employing either bilateral or skylighting in every case. In all cases where two floors were adopted, intricate planning was necessary, so that both floors could enjoy cross lighting. One such solution employed in Essex, was the overhanging of the upper classroom so that the corridor was above the ground floor teaching area.

Before the daylight factors were introduced, the accepted standard was a minimum factor of 0.5 per cent. This has now been raised to a minimum of 2 per cent and a recommended percent of 5. Orientation has proven a great aid in achieving this required standard, and consequently all classroom blocks have south-east exposure. This is an accepted procedure in all schools.

With all classrooms on only one side of the corridor, the main weakness of the one-storey scheme is the great tendency to sprawl. This is evident by the fact that the relationship of actual working space to ancillary area is now 1 to 2 or even higher. This has definitely increased costs, due to relatively large areas to be heated, lengthy piping services and a high proportion of foundations and roofs. As yet, no solution has been brought forth to solve the difficulty, but as the architects feel orientation is definitely the most important factor, they are ready to sacrifice large ground areas and higher costs to achieve it.

Along with the disadvantages gained through utilizing only one side of the corridor, is the difficulty in keeping corridors to a minimum in length. At times, plan layouts were almost forced to secure an effect of short corridors. Classrooms were often jogged to create breaks – for pyschological reasons. Usually this method was quite successful, but it did tend to create unnecessary complexity out of what otherwise might be a straightforward scheme.

Most of the school building programme and certainly research so far, has concentrated on the Junior and Infants School. Space within the structure is generously divided and each group of teaching areas (usually 3 classrooms) has their own lavatory facilities as well as cloakrooms and storage spaces. The use of separate cloakrooms (not necessarily adjacent to the classrooms) is a pleasant feature that should be incorporated in all Canadian schools.

Classrooms are no longer merely a place to work, but are complex and extremely flexible in nature. They are a humdrum of activity—workshops, studios and play-spaces. The most recent innovations are to break up the room into a series of alcoves, each holding one or two small groups, reduce the scale of clerestory lighting and to utilize the corridor as an extension of the teaching space. Thus, all classroom and corridor partitions are flexible (sliding doors) and the whole has been treated as one space.

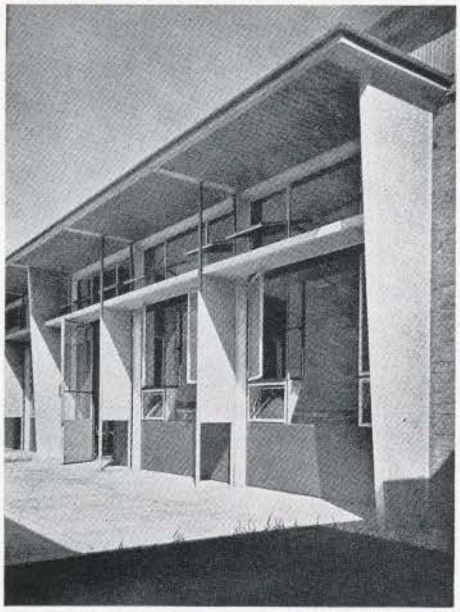
All teaching areas are planned around exterior court yards, with asphalt play areas and the necessary sand pits, paddling pools, etc., being adjacent. No longer, is there evidence of separate entrances dogmatically labelled Boys and Girls. The main entry and lobby is forceably used by parent, guest or child alike. Usually the assembly hall and dining area is linked to the foyer so that walls may be folded back and the entire area become one unit.

Colour

Perhaps the finest feature (certainly second only to the structural systems evolved) is the way colour has been utilized. In all cases, colour has been utilized in an "organic approach." Here, colour and form are considered inseparable. For each surface to fulfil its natural and functional condition, colour must "speak the truth" and express the designer's original intention.

There are a vast number of factors that determine the appropriate use of colour. I consider, by far, the most important factor is the children. With their bright clothes, high-pitched voices and quick movements, they create exciting patterns, whatever activity they are engaged in. Biologically, they are attracted to primary colours, and hence the schools must arouse and reflect these tendencies. Certainly the schools of the Hertfordshire group are the greatest exponents of this theory. Brilliant colour is employed both indoors and out. Generally there is a different treatment for each wall, ceiling, as well as furniture. In contrast, it is interesting to note the philosophies of the Swiss. Here, the use of colour is restrained to a small portion, be it a painting or fragment of coloured glass. Main masses are kept in neutral shades, as it is felt the children themselves create a sparkling pattern and to unnecessarily repeat such feeling into the decoration would only cause discord.

Colour also has the ability to distinguish various activities of a building. In entrance halls and circulation areas, where there is a constant movement, bold colours have been employed, and often most stimulating effects have resulted. The use of planting, together with materials of varying texture also enhance these ideals. Generally, the entrance hall has been made the most vivid and exciting unit in the school. It is purposely made to look inviting. In assembly halls and dining rooms, where large groups converge, a more dignified approach is utilized. Bright and jolly colours are used for psychological reasons, but the treatment is limited to larger areas. Tinted acoustic tile, natural wood and curtains of unusual pattern have often been utilized to, as the Hertfordshire group states "create something more than a merely passive background – a character which will catch the imagination on entering." Teaching areas have been treated more informal and domestic in character. This is due to the multi-activity



CLASSROOM WING

Manford Way Primary School, Chigwell
Harold Conolly, Architect

these rooms are planned for and no longer is an institutional setting applicable.

Lastly, is the obvious relationship of colour toward the aesthetics of the structure. The prefabricated frame construction used by most of the schools presents a visual pattern of beams and columns with panels inserted between them. With so much of the structural system actually exposed, a discipline had to be maintained in the interiors so that a conflict between structure and wall panels would not result. Consequently, most structural members have been constantly painted a neutral shade (pale grey) in order to avoid an inappropriate decorative treatment, while the "filler" or wall panels receive colour (usually bold) appropriate to the spaces they enclose.

The aims of architectural design and colour is generally at spaciousness and gaiety, at unpretentiousness and extreme informality. Nevertheless, in many cases the solutions failed to achieve such pleasing proportions. Colour is often unnecessarily used to the degree where the whole concept glows like a brilliant paint box. The ultimate will be a more restrained and refined solution of the same problem. The tendency in most architectural offices has been for the job captain (designer of the project) to decide on the individual colour schemes. Few cases showed the consultation of a qualified interior decorator. Thus, the schools do, to a great extent, express the character of the designer. Schools executed under one authority were found to be in some cases brilliant and gay with bold patterns, while in others, quite restrained and often unnecessarily severe. This tendency has the advantage of divorcing the schools from what otherwise might become a standardized method of treatment.

Sculpture

Other methods have also been employed to aid in the decorative schemes. Superimposed and changeable units of decor like curtains, planting, pictures, books and sculpture are to mention but a few.

Of particular interest is the emphasis placed on the value of sculpture and mural decoration. Local authorities generally allocate a small proportion of the total building cost for the work of sculptors or mural artists. It has been found that due to the prefabricated methods of construction, sculpture can contribute more successfully to the character of the school when it is free-standing than when it is carved into the wall surface or placed in a special niche. Usually an informal siting is adapted and the backgrounds (material, size and distance away) have been carefully considered. Generally, sculpture is of a subject appealing particularly to children, as the Kangaroo flagstand at Canley School, Coventry. Perhaps the finest work is at the Barclay Secondary School, Stevenage where a piece executed by Henry Moore adorns the main entrance. The siting here is of particular merit. In the cases where sculpture has been carved into the actual wall surface of the building, it has been executed in a large scale so that the children might readily view it. Subjects like a stork (Lancashire School) or dancing girl (Essex School) have become a constant delight to the children. In both cases, the work was carved on the site in special bricks of greater strength and thickness. Carving in wood or stone has a great attraction for children and can provide an excellent stimulus for the development of a real understanding of beauty in form and material.

It might be of value at this point to briefly discuss some of the schools in the various localities visited.

Coventry

The problems confronting Mr D. E. E. Gibson, County Architect and his staff at Coventry were totally different from those of the other groups. Due to the extensive war damage (Coventry suffered tremendously during the war) there arose a great demand for new schools. The situation required the immediate design of a structural system that could be erected quickly by relatively inexperienced labour. The final solution, a light steel frame prefabricated in type, was the first used in the Henry Parkes Primary School at Canley (planned in 1947 and completed only in 1950). This frame was the result of a close co-operation with the Brockhouse Engineering Company of Southport, England. It was designed to reduce the total steel tonnage of the building to a minimum (a 40 per cent saving was anticipated). Therefore, light steel strip mostly 10 gauge was selected. This allowed all of the structural units to be built up of foldings, formed where necessary into box sections of minimum overall dimensions. All sections are factory-produced, and it is possible to erect complete classroom wings with available site labour, without the use of a lifting tackle.

Exterior walls (non structural) are usually brick with cavity construction or hollow clay block (again of cavity construction) cemented externally and plastered internally. All interior partitions are of hollow block plastered. Roof sections are either of corrugated reinforced asbestos sheeting with an underlayer of insulation board or of steel decking with insulation board on both sides, bituminous felt being the exterior finish.

Hertfordshire

In the immediate post-war period, Hertfordshire, (under the able direction of Mr S. H. Aslin, County Architect) like the other English counties, was faced with the acute shortage of schools. Beside the effects of bombing, lack of repairs and general rise in birth rate, the development of war industries and the policy of creating new towns in counties around London, made the problems more acute here than in most regions.

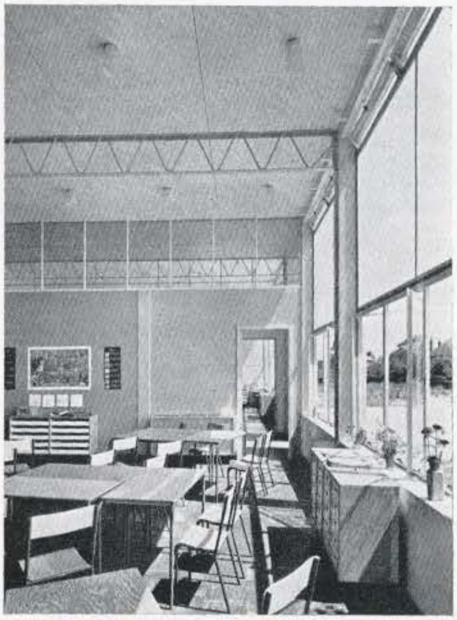
A "Meccano" type of construction based on an 8 foot 3 inch module has been adopted in all schools. This module, employed by most authorities has been determined largely as a result of the recommendations of the Wood Report 1944 and the fact that steelwork manufacturing plants were already jigged for this size. The framing members consist in the main of stanchions (assembled from 2 inch x 2 inch angles held together by angle welded to outside angles at regular intervals) beams, cross bracing and ties cantilever eave outriggers (T sections) and horizontal cladding bars (to which exterior materials are bolted). Of particular interest are the beams of channel section for the top flange and flat plate for the bottom flange; the flanges separated by welded diagonal lacing. The open webs do not obstruct the view, and are left exposed to allow free passage for mechanical pipes.

Wall slabs of precast concrete slabs are finished externally with either. Derbyshire spar, rough tyrolean finish or coloured cement. They are set either vertically or horizontally and are joined in a tongue and groove fashion, the whole portion being bolted to the cladding bars. A "wet" construction has been completely avoided, and interior wall linings are of fibrous plaster three-quarter inch thick back with aluminium foil. All interior partitions, are of a 2 inch thick fibrous plaster with a wood wool core finished with oil paint. Stanchion casings are three-quarter inch fibrous plaster. A wide range of flooring materials have been used, including hardwood, accotile (type of mastic tile) quarry tile and grey marble.

Essex

The programme of the Essex County Council (Harold Conolly, County Architect) is certainly the most extensive of all authorities visited. Beside the regular demands the group must also furnish schools for five new housing estates, of approximately 6000 houses each being built by the London County Council, and two new towns, Harlow and Basildon, being planned as satellites in conjunction with the London Master Plan.

Thus, with such a gigantic undertaking, it was obvious that a new technique in the design and construction of the schools would be required. The ideal of individually designed jobs was, for the moment, but a luxury, and some degree of standardization would have to be introduced. Nevertheless, it has not employed to the extent of the Coventry or Hertfordshire groups. "There is no 'standard' Essex plan, nor is there any system of complete prefabrication of schools in the work of the department. It is held that each school, whether for primary or secondary education should possess its own individual features and architectural appearance if it is to build up a special tradition as successive generations come and go."*



CLASSROOM INTERIOR
School at Hitchin, Hertfordshire
C. H. Aslin, County Architect

Ten various forms of construction have been used for primary and secondary schools, mostly variations of systems of precast concrete, insitu concrete and steel framing. The system of forward or bulk ordering, popular with the Hertfordshire group, has been practiced most extensively. This ordering not only improves deliveries but also helps by affording reduced prices.

A word might also be said for the part played by separate companies in the school programme. Mention has already been made of the Brockhouse Engineering (Southport) Limited who along with the County Architects of Coventry has divised a unique prefabricated structural system. The Bristol Aeroplane Company Limited has also devised a unit construction for schools. The aim of the Company has been to provide the educational authorities with a range of standard units which may be assembled in several ways to produce the various components of a modern school. Realizing the importance of flexibility, no attempt has been made to produce a standard classroom or school. In general, aluminium wall panels and roof trusses have been designed in a four foot module. Various spans of the trusses are readily available. The wall panels are, in reality, an insulated and sound-proof sandwich.

(continued on page 151)

* Architectural Times, November, 1949.

PERSPECTIVE LOOKING S.W.

JOHN B. PARKIN ASSOCIATES

ARCHITECTS

OAA HEADQUARTERS BUILDING

1st FLOOR

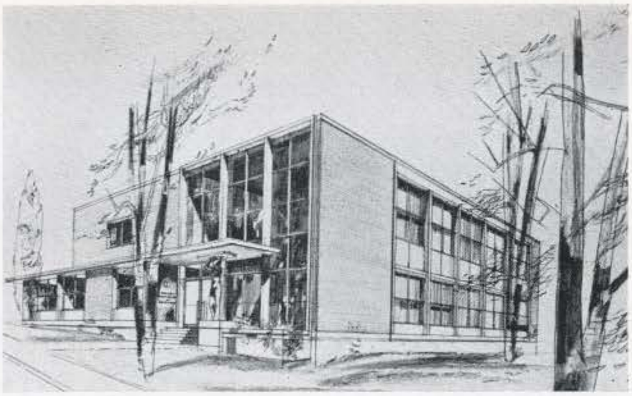
GROUND FLOOR

After sixty years of rented premises, the Ontario Association of Architects has decided to build. With that in mind, a site was purchased in a central location near to Bloor Street, Toronto, yet partly surrounded by park land. A ravine road skirting the park will take care of parking.

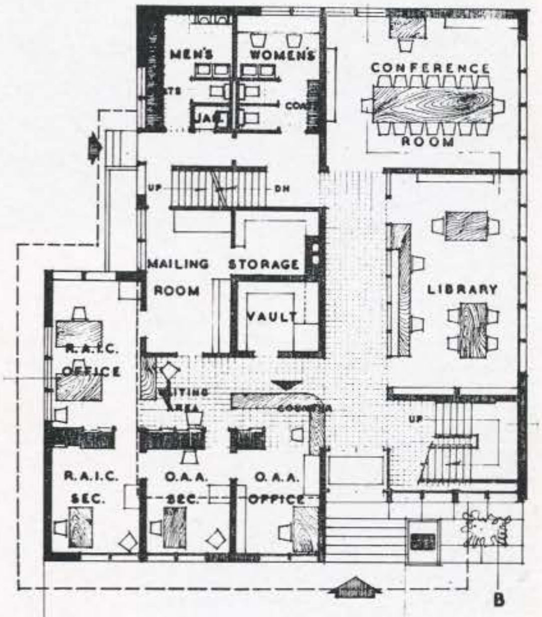
To arrive at a design, a competition was held with Messrs Marani (Chairman), Arthur and Brown as Assessors. The accommodation required consisted of offices for the OAA and (temporarily) for the RAIC, with a Board Room

COMPETITION

shared by the two organizations. Other accommodation consisted of Lounge, the Library, two bedrooms for out of town members like the PRAIC, the POAA or lesser fry, and houseman and wife. It was a condition of the competition that the library should be conveniently supervised from the OAA office. The drawings illustrated are those of the winner, J. B. Parkin Associates, and the three runners-up, Messrs Hassig, Page & Steele, and Worsley. Altogether thirty-seven persons or firms competed and the standard of design was very high.

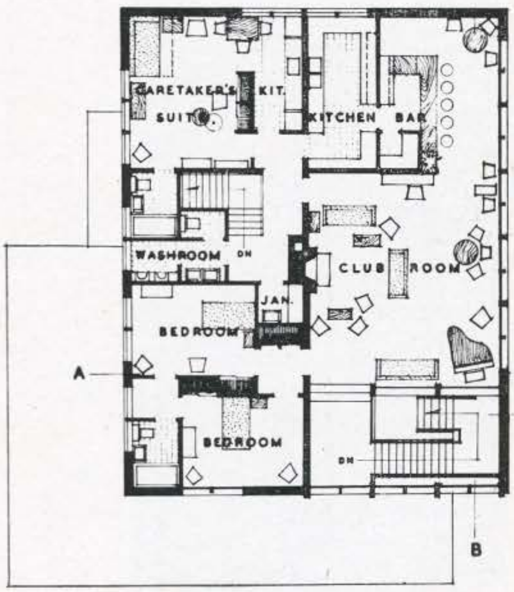


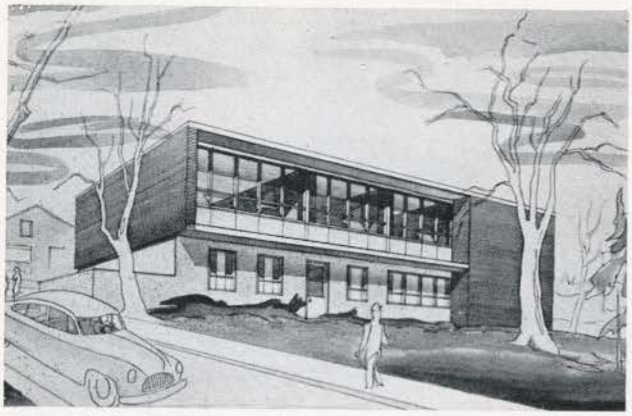
PAGE & STEELE ARCHITECTS



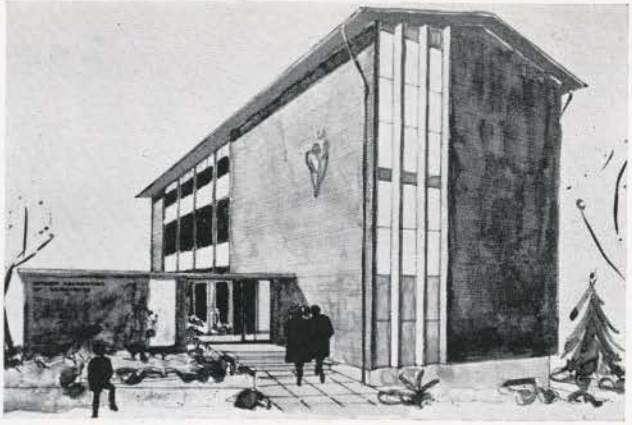
1st FLOOR

2nd FLOOR

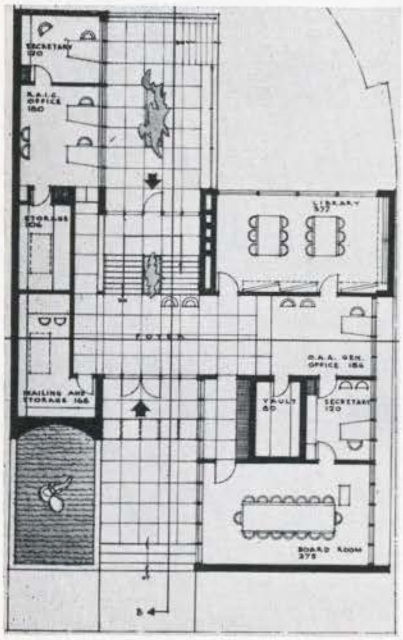




CHARLES R. WORSLEY
ARCHITECT



GEORGE HASSIG
ARCHITECT



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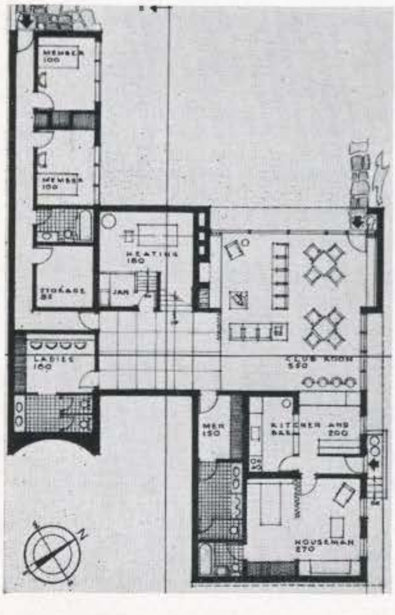

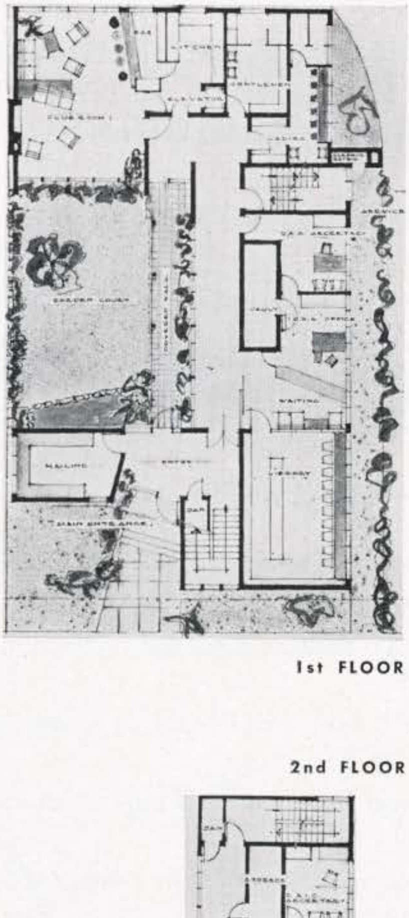

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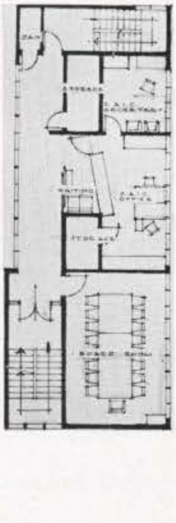
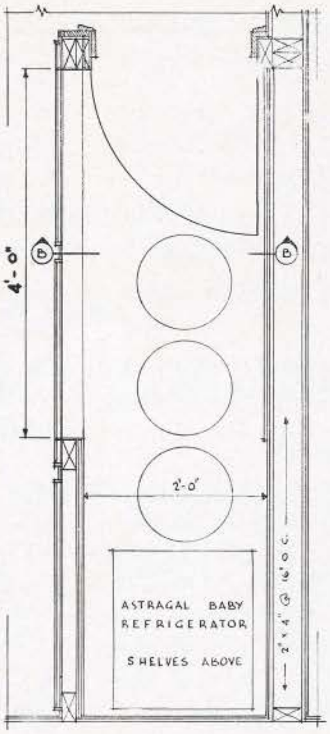
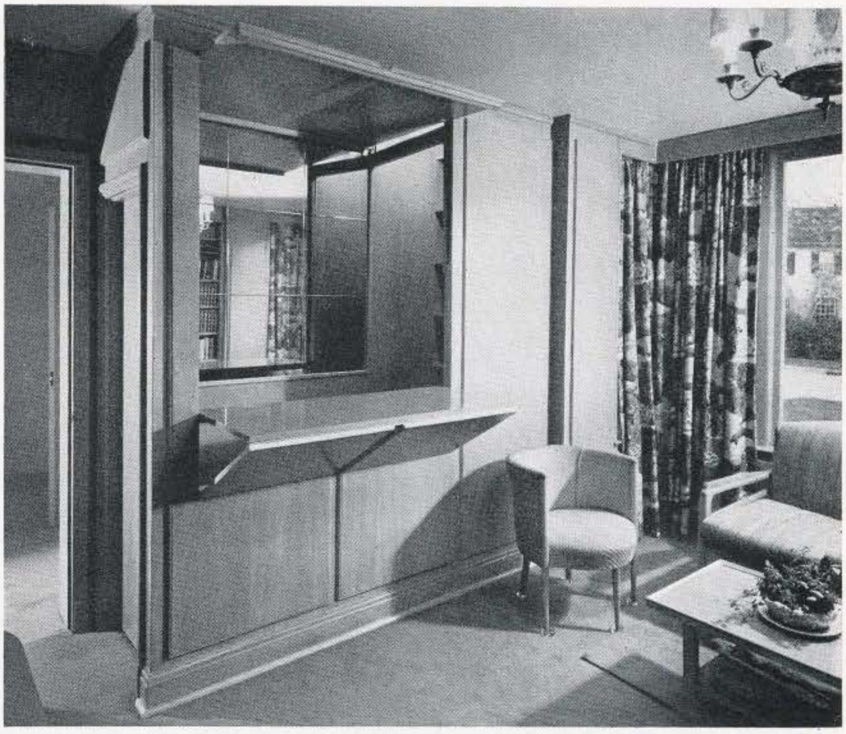
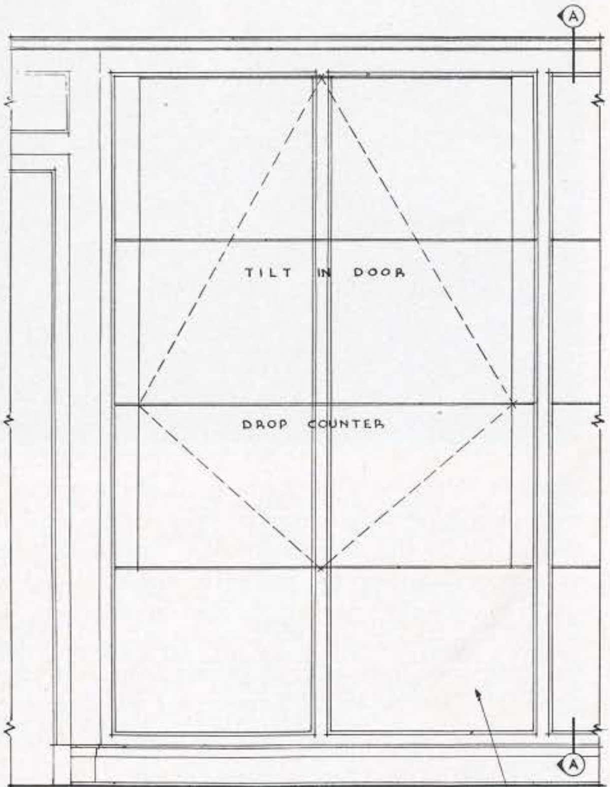


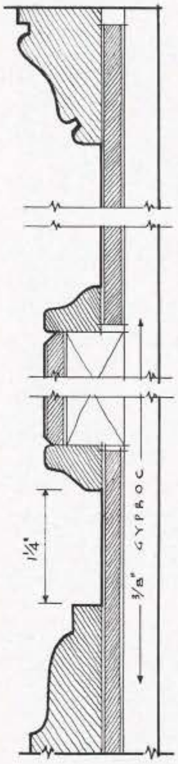
OAA HEADQUARTERS BUILDING COMPETITION



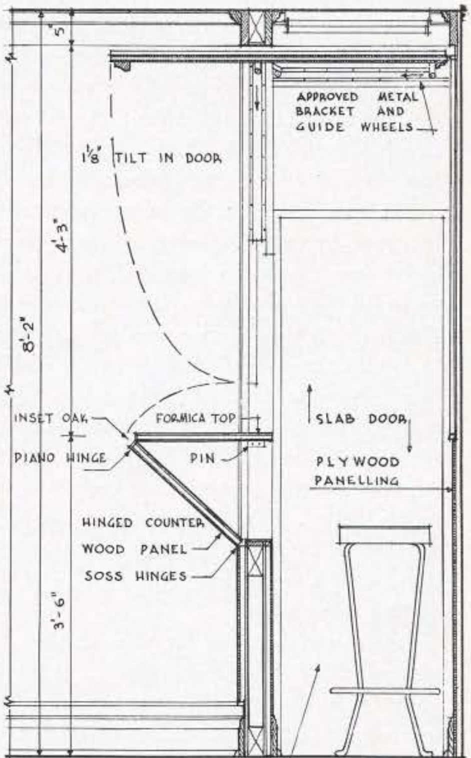


PLAN 1/2" 1'-0"





'A - A'



WEST WALL ELEVATION
SCALE : 1/2" 1'-0"

SECTION AT 'B B'
SCALE 1/2" 1'-0"

COCKTAIL BAR

RESIDENCE FOR MR. & MRS. I. SUSSMAN TORONTO

PAGE & STEELE
ARCHITECTS TORONTO

NEWS FROM THE INSTITUTE

ALBERTA

The government of the province of Alberta, during its past session, undertook an examination of the Acts under which various professional associations operate, including the Architects' Act. The Alberta Association therefore conferred with the minister in charge of this work. Committees met, taking legal advice, and a number of changes were suggested both on the part of the government and on that of the association. These changes were apparently satisfactory to both these parties. But, at the close of the session, the bill had not been introduced in the house. The old act therefore remains unchanged. This is a disappointment for the Alberta Association of Architects for they hoped to have some very definitely beneficial changes made.

One of the proposed changes was to a clause requiring the employment of an architect for all buildings exceeding the cost of ten thousand dollars. This clause had become somewhat of a headache to building inspectors in issuing their permits to build. Besides the difficulty in determining costs they had to face a variety of ways in which applicants endeavoured, more or less successfully, to evade the requirement. It was therefore thought to be sounder policy to base the need for the employment of an architect on the character and extent of the work. Fire-resisting construction, extent of floor area and the length of clear spans involved were considered to be a better basis to go on. It may be within the competence of municipal bylaws to cover this requirement by their own regulations. But these can only apply locally and have no force over large areas of the province where there are no regulations, although they are more needed there than elsewhere.

Another proposed change in the Act was in the clause regulating the fees authorized for admission to practice and the annual fees. It was mutually agreed that these were inadequately low. They were set at a time when the Association was a very small body and when money went much further than it does today. The present much larger number of members increases the income of the Association but it also increases the work and the responsibilities of the Association.

Older members of the Association will recall that it struggled for quite a number of years with a substantial balance, in the red. On one occasion the Association had invited the RAIC to hold its annual meeting in Calgary. It is said, and can be believed, that the Calgary members, with the hospitality characteristic of that city, engaged the credit of the Association in a delightfully open-handed way. To this was attributed the blushing tint of the financial statements. By some strange magic the red at last turned to black, even on the meagre fees then, and still, in vogue and (touching wood) the black still leads.

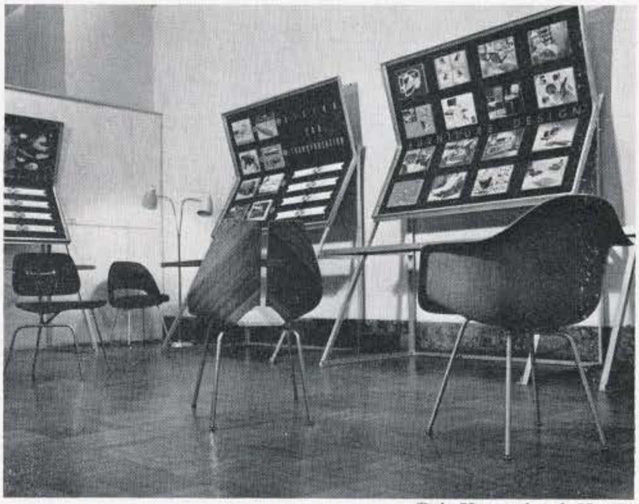
It is to be hoped that the fact of the revision of the Architects' Act not having been presented to the House does not mean that the idea of revision has been entirely dropped.

Cecil S. Burgess

INDUSTRIAL DESIGN: 1951 BC-AD 1951

It is just possible to describe this Exhibition in the space of a book review if one takes note of its two main aspects only.

Three-quarters of it traces the history of design from the most ancient period with its limited materials, tools and programme to that of the greater potential of the present day. All this is done on 35 demountable panels of bent perforated masonite, aluminum angles and African mahogany shelves. The active co-operation of the Royal Ontario Museum and the National Gallery of Canada gives this section an authority worthy of its function of informing Canadians on this increasingly important subject. Along with its review of product design, the Exhibition shows the development of such contributing factors as sources of power, the history of machines and handcraft, typography, packaging, and architecture. Elder architects may remember George Hansom, architect of the handsome Town Hall of Birmingham, who also designed the hansom cab. Younger ones will hail the contemporary architect Eames and his contribution to furniture design.



Bob Howard ref. No. 14

Throughout all, the four timeless aspects of Appearance, Performance, Production and Presentation are illustrated by a series of highly selective examples of fine design.

The second section tells of industrial design as an established profession, having the solid support of the highest forms of promotional and educational organization in Great Britain, the U.S.A., and Canada. In Canada, the now permanent N.I.D.C. will occupy the ground floor of the Laurentian Building in Ottawa. Indeed, 1951 is a momentous year in the history of Canadian design development.

Architects in any town having space for the Exhibition should ask the National Gallery to send it for their fellow citizens to see. It has been admired and appreciated where it has been shown.

G. Englesmith

POST-WAR SCHOOL PROGRAMME IN ENGLAND

(continued from page 145)

They consist of an aluminium inner skin, thick layer of glass fibre, one layer of building board, and an outer skin of aluminium.

The system certainly is ingenious in concept and offers many opportunities, particularly the saving of time in erection (it takes one quarter the normal building period to erect). However, it would be most discouraging if this system, in its present mode was too readily utilized. It is quite true that variety is achieved by colour and part of the school being built of traditional type construction, but the overall effect is still obvious – one of complete standardization. Until the time when the structure becomes more versatile in concept, every school will essentially appear the same. The overall success of the initial scheme makes one confident that still more research will

CLASSROOM WING

Mixed Junior Infant & Nursery School
Canley, Coventry
D. E. E. Gilson, Architect

be employed until a unit has been perfected that carries more warmth and human spirit with less metallic glow and factory appearance.

In America, where conditions are totally different, prefabrication, in any large scale should be completely avoided in all school design. Environment is the all important part of education. It is up to the architect designed school to teach our children how to live.

In conclusion, the following remarks by Mr H. Conolly (Essex County Architect) admirably express the ideals of all English architects interested in school building.

"We have tested many forms of new building techniques to provide the number of schools needed in the time available, and to experiment as much as possible. We feel that it is too soon to fix our building programme exclusively to one or two systems. And so we go on, always searching for better plans and better components, in the hope that some day we shall find the ideal in both. The ultimate test of our work is, do our buildings help John and Mary, our real clients, in the big job of growing up? And that is not for me to say."

ACKNOWLEDGEMENT

The Editorial Board wishes to thank Mr Harland Steele most heartily for his advice and assistance in the organization of the School issue.

CONTRIBUTORS TO THIS ISSUE

John H. Bonnick graduate of the School of Architecture, University of Toronto. First recipient of the Goulstone Fellowship, for the study of Architecture in England. Recently completed an extensive Architectural tour of England and Europe, specializing in schools. Has worked for Architects in Boston, U.S.A., and Toronto. At present in the office of Gordon Adamson, Toronto.

William W. Caudill received degrees from Oklahoma A&M College and MIT 1937, 1939 respectively. Member of AIA Committee on School Buildings, National Council on Schoolhouse Construction, and Texas School Plant Study Committee. Organized firm, Caudill and Rowlett in 1946.

William M. Pena attended A&M College of Texas and received B.S. in Architecture in 1942. Returned after service in the Army to receive B. of Architecture in 1948 and was awarded the school medal of the American Institute of Architects that year. Joined firm of Caudill, Rowlett and Scott in 1948.

A. Leslie Perry was born and educated in Montreal, and a graduate of Architecture, McGill 1923. He was attached to offices of Nobbs and Hyde Architects, Montreal and George B. Post and Alfred C. Bossom Architects, New York City. He has been in business since 1925 part of which time was in partnership with Messrs Luke & Little, Architects and for the last nine years has had his own office.

Francis G. Reed, born in Ohio of Canadian parents and educated in Saskatchewan. Graduated University Manitoba, 1931, B. Arch. Joined Lighting Service Dept. of The Hydro-Electric Power Commission of Ontario in 1938 as Lighting Designer, and is now Assistant Lighting Supervisor. After his discharge from the Army and still on leave of absence from the Ontario Hydro, he spent one year in the offices of W. L. Somerville and Craig & Madill.

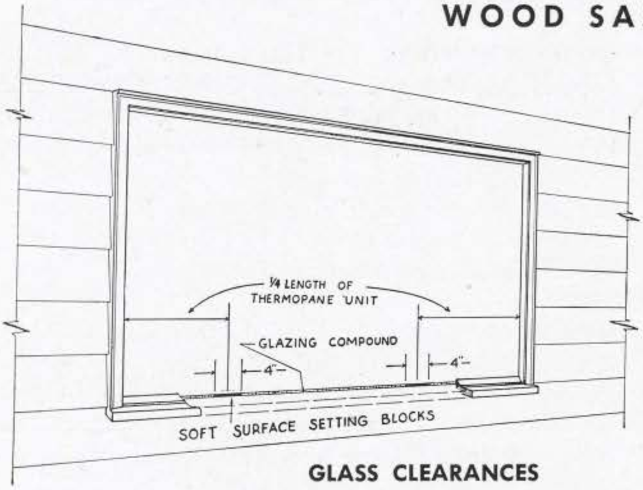
Now in charge of the technical operation of the Commission's Lighting Service Department and principally occupied as a lighting consultant to the Ontario Department of Education and to architects and their consulting engineers.

Facts by Pilkington about Glass

FOR ARCHITECTURAL STUDENTS

VOL. 2 — No. 1
THERMOPANE GLAZING
DETAILS AND DATA

DETAILS FOR GLAZING EITHER STATIONARY OR MOVABLE WOOD SASH WITH THERMOPANE



The characteristics and uses of Thermopane window insulating units were dealt with on pages 22, 23, 24 and 25 of Volume 1 and examples of Installation were shown on pages 43 and 44 of the same. This page gives details of installation.

Thermopane units should be set on soft surface setting blocks. These blocks should be the same thickness as called for by B in table below and of a width equal to the thickness of the Thermopane unit. They should be located in from each corner and centered a distance of one-quarter the horizontal edge of the unit. (Per illustration.) Soft rot-proofed wood, soft lead, or metal blocks with soft lead tops are used.

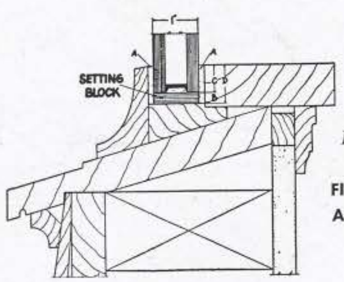
GLASS CLEARANCES

Since Thermopane is a factory fabricated unit, it is not subject to further processing and its dimensions cannot be changed at point of use. Therefore, proper glass clearances must be allowed on all edges.

RABBET DEPTHS

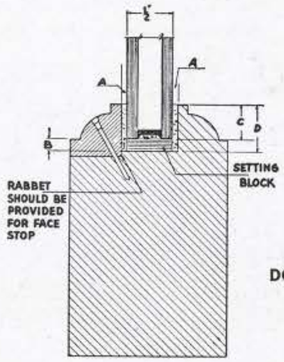
So that the metal seal does not show, sufficient rabbet depth must be allowed. To achieve this, the metalized edge depth must be added to the glass clearance.

The following chart illustrates these points:



Drawing is one-quarter actual size

FIXED PICTURE WINDOWS AND/OR WINDOW WALLS



Drawing is one-half actual size

DOUBLE HUNG, CASEMENT AND/OR SMALL FIXED SASH

Symbol and Explanation	Glass Thickness					
	24 OZ. 1/8" Plate 1/8" Patterned	3/16" Sheet Glass		1/4" Plate 7/32" or 1/4" Patterned		
Glass Sizes	under 80 united inches†	under 80 united inches†	from 80-120 united inches†	under 80 united inches†	over 80 united inches†	over 120 united inches†
A—Glazing compound Bed	1/16"-1/8"	1/16"-1/8"	1/8"	1/8"	1/8"	1/8"
B—Glazing Clearance (all edges)	1/8"	1/8"	3/16"	1/8"	3/16"	1/4"
C—Metalized Edge—Depth	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"
D—Total Rabbet Depth B+C	9/16"*	9/16"*	5/8"*	9/16"*	13/16"*	7/8"*

†Sum of length plus width. *Allowance made for dimensional tolerance.

AIR SPACE

1/4" or 1/2" air spaces can be furnished on small units, but for building exteriors sizes 48" wide and over will be furnished with 1/2" air space only.

Further details on the installation of Thermopane will be given in Vol. 2 No. 2