● Frontispiece. ● Photo Duncan Howie

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THE SOUTH AFRICAN ARCHITECTURAL RECORD

The Journal of the Transvaal, Natal and Orange Free State Provincial Institutes of South African Architects and the Chapter of South African Quantity Surveyors.

202, Kelvin House, 75 Marshall Street, Johannesburg. Telephone 33—1936.

Volume Twenty Two Number Four, April Nineteen Hundred and Thirty Eight

- STATIC
- RESISTANT
- CONSTRUCTIVE
- DETERMINATE

The pattern and texture of industrial forms: the realisation of scientific predeterminations a facet of structural geometry: a demonstration of man's triumph over nature.

MUCH ADO ABOUT NOTHING

The Union Journal Sub-Committee, which met in February, decided to recommend to the Central Council, (a) that the journal be purchased outright by the Central Council and (b) that the control of the journal be vested in the Central Council on the understanding that the editors and staff carry on with the existing machinery, subject to their expressing such views as are compatible with the policy and desires of the Central Council.

The existing Journal Committee met the Sub-Committee and discussed the foregoing proposals, which were approved in principle.

The Executive Committee of the Central Council met later and decided to refer the full minutes of the discussion to the constituent bodies to enable them to give a mandate to their representatives at the next meeting of the Central Council.

Reading through the minutes, one cannot help feeling that much ado about nothing has been made of the whole issue.

At the same time, one cannot help being surprised at some of the statements made by responsible members of the profession.

Attention was drawn at the outset to " the valuable and profitable asset the Master Builders had in their journal, which was exceedingly popular, even amongst architects, because of the excellent reading matter in it." The Master Builders' journal is essentially a trade journal, interleaved with advertisements, and although from time to time it contains articles of technical interest, it is doubtful whether the majority of our members would like our journal published on similar lines.

It was further mentioned that the " Architect, Builder and Engineer " was far more popular with architects in the Cape than the " Record," but this view does not appear to be shared by members elsewhere.

Stress was laid on the fact that the " Record " was merely an art journal, run for University art students.

This is a statement which requires elucidation, and we should like to know what is meant by the term " University art students." One frequently hears the word " arty " used by some of the older members of the profession, but we are at a loss to understand what is meant by such a word.

It is generally admitted that architecture is an art as well as a science, and comes under the category of the fine arts. In the finest periods of architecture the arts of architecture, painting and sculpture were closely allied.

The greatest architects of the past were practitioners in all three branches of art.

After a century or more of stagnation, architecture once again is coming into its own as a fine art and a closer relationship exists between it and its allied arts.

Is it not to our advantage, therefore, to stress these allied branches of art rather than to ignore them ?

Criticism was levelled at the make-up of the journal and the designs of the cover, which were described as " of a jazzy nature " and not in keeping with the dignity of an official professional journal.

The make-up of the journal has been favourably commented upon in the Press here and overseas, and the covers of the journal are quite in keeping with those of the leading architectural journals in other parts of the world. When illustrations are used on the cover they have been selected to indicate the nature of the contents. We doubt very much whether the profession would like us to revert to the type of cover adopted by the R.I.B.A. journal, as has been suggested, and thus lose our individuality altogether.

The criticism that some of the illustrations are not in the best of taste is too trivial to discuss. It must be remembered that the " Record " has been, in the main, a Transvaal journal, and members in the Transvaal have not taken exception to articles or illustrations. As a Central Council journal, it naturally follows that due consideration will be given to all shades of opinion.

It was suggested that the journal should publish more technical information, that it should reflect all shades of opinion within the Institute, and that it should hold the balance fairly as between the two contending styles, modern and traditional.

We can fairly claim that this has been our policy for the past twelve years, as a glance at the files of the journal will prove. There has never yet been a bias in one particular direction.

As for matters of professional importance and professional interest not being attended to, as was stated, we can only ask for an explanation of such a statement.

It is quite obvious that the majority of our critics do not realise the amount of work entailed in the production of a monthly journal, nor are they aware of the fact that contributions are difficult to obtain in these busy times. The editors are frequently let down and have to rush round, at the eleventh hour, to collect matter from other journals or produce something themselves. This entails delay in the production and disorganisation in the printing of the journal.

The question of "control" figured largely in the discussions, and it is quite clear that some of the members wish to see that complete control in the matter of editorials, articles, illustrations and make-up is exercised by the Central Council.

We maintain that such a procedure is quite impossible, and, further, that the Central Council, while it may be composed of representatives of the constituent bodies, does not always represent the views of the majority of the members of those bodies. This has been proved time and again in the past. The only possible solution of this question of control was clearly indicated, in our opinion, by Mr. Furner, a former editor, who said : " With regard to the principle they were discussing, every architectural journal was in some measure a work of art, and every editor must be given the right to exercise his discretion; if the work of the editors was interfered with, the result would be the production of a nondescript journal of value to nobody. It therefore seemed to him that the Central Council, in consultation with the constituent bodies, should appoint their editor, give their suggestions, and, during the period of his editorship, he should have the final say in the production and " get-up " of the journal. Apparently there was a fear that if the Central Council took over the journal, and made certain suggestions, the editors would resign. He thought that was assuming something that was not going to happen." Mr. Furner further suggested, in order to bring the matter to a head, " that the Central Council, at its next meeting, should decide whether or not it wanted to take over the journal, and if so, to indicate its views as to policy; the matter would then be referred to the Transvaal Provincial Institute, and, if it agreed, the editors should be appointed for a definite period, and during that period the editors should have complete control. He was definitely of opinion that the editors should not be subject to constant vetoes."

What is required to make this journal an unqualified success, is the wholehearted support and co-operation of the profession. If that is forthcoming our journal will become the profitable and valuable asset which some commercially-minded members desire, and at the same time we shall produce a journal which will be, as it should be from an architectural point of view, a work of art.

AITON COURT, JOHANNESBURG

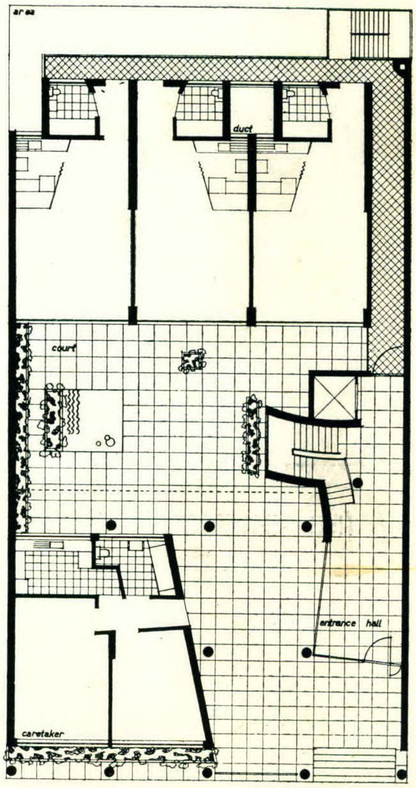
A Commentary by Ray Kantorowich.

An architect who attempts to solve an architectural problem within the limits of our present town-planning arrangements finds at the outset that he is completely encircled by restrictions. It is impossible to design, say, a block of offices from absolute postulates as to the building's functional and aesthetic requirements. The width of streets, the value of frontage, the size, shape and aspect of the site have such an extensive bearing upon the solution that a rather disappointing compromise is bound to result. Any contribution that a building may make to the city's architecture must be within this ever-dominant compromise, and will show, broadly, a clearer understanding of the limitations imposed with an ability to circumvent them to a greater architectural degree than usual, and, in detail, a more subtle and resourceful handling of the small elements that combine to form the ensemble.

It is upon lines indicated above that the achievement of Aiton Court, a block of bachelor flats and rooms, will be discussed.

THE INTERIOR OF A FLAT IN THE BACK BLOCK OVERLOOKING THE COURTYARD

VIEW FROM NORTH-EAST



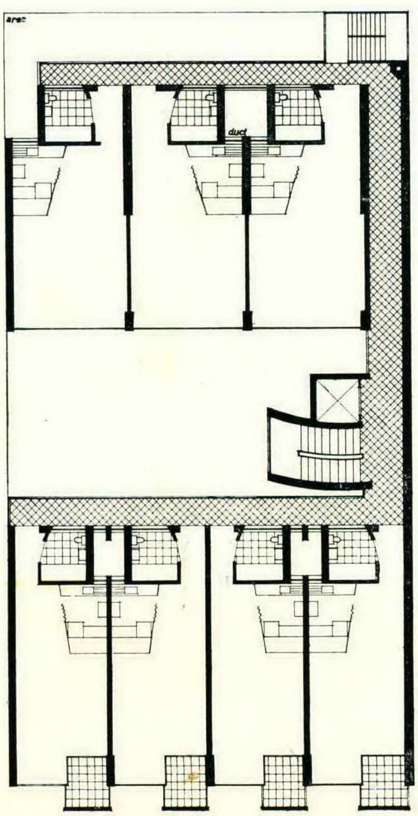
GROUND FLOOR PLAN

scale: feet

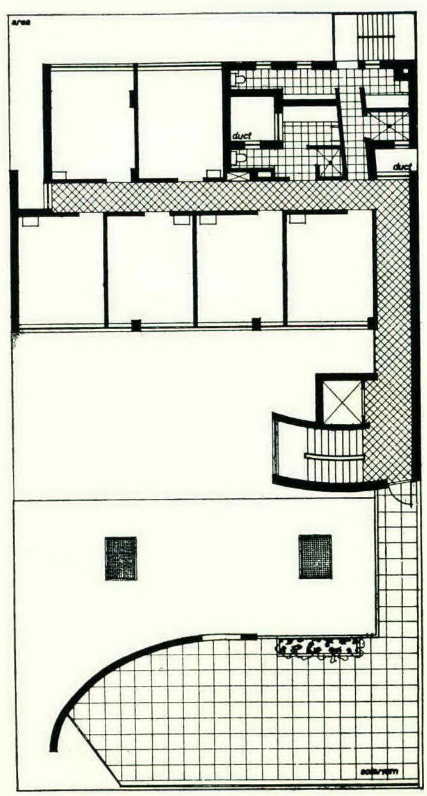
AITON COURT ● JOHANNESBURG

Associated Architects ● W. R. and Angus Stewart

● Bernard Cooke



TYPICAL FLOOR PLAN - FLATS



TYPICAL FLOOR PLAN ROOMS

C. I-S

THE COURTYARD SEEN FROM THE ENTRANCE ● Photo: Kantorowich

The site is a typical suburban one, 50ft. in frontage and 96ft. deep, facing north on to a quiet side street. The essence of the problem from the practical point of view was to give a northern aspect to each and every flat and to ensure that all would have northern sun for the major portion of the day.

The accommodation demanded was too large to enable the flats to be arranged in a single block across the stand, so that it was necessary to have a front and a back block. It is at this juncture that the radical departure from common Johannesburg flat practise was effected. It was found, after an elaborate set of calculations had been drafted, that should the front and back blocks be separated by an ample courtyard and the front block be kept low, sun would be able to strike down to the lowest flats of the back block.

A very interesting massing of the component elements results. The low front block, the tall rear block, the vertical circulation (lift and staircase) centrally placed on the west boundary of the site, with corridors running in either direction linking to each block.

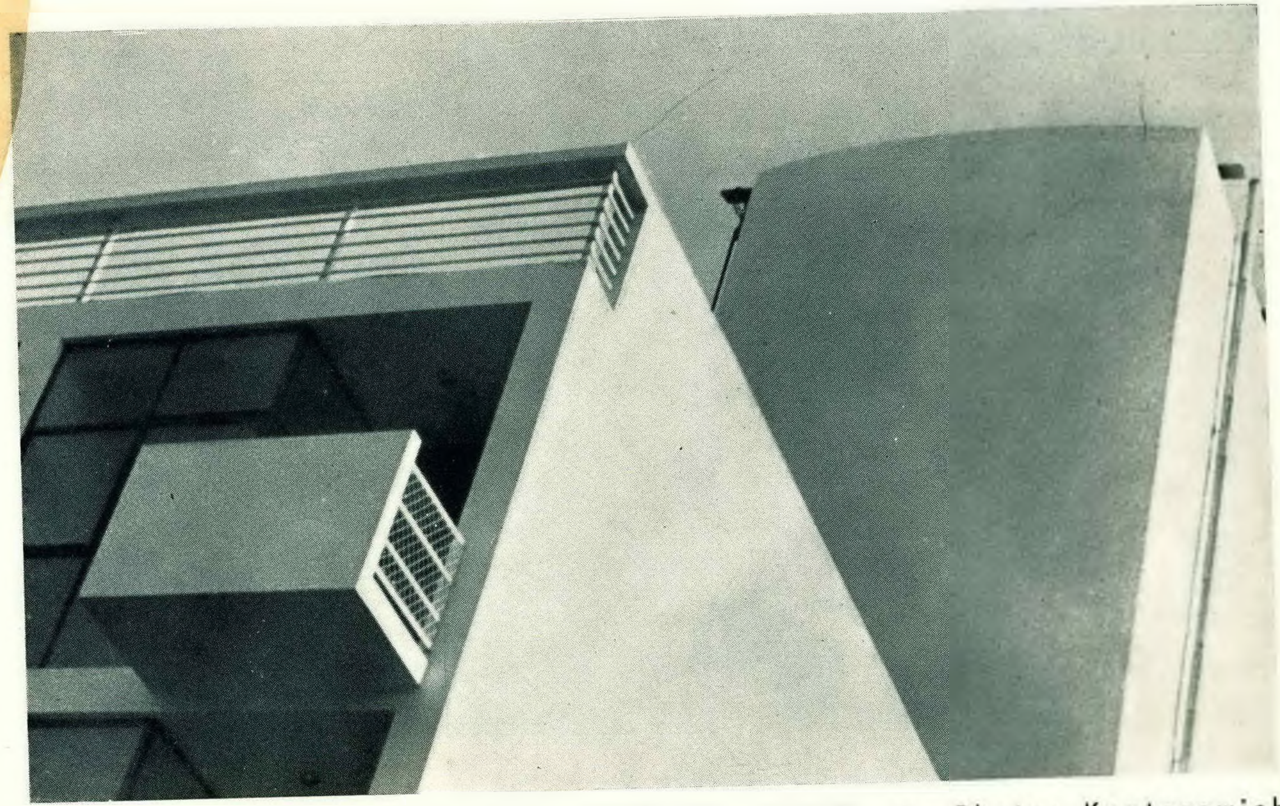
The arrangement takes on added significance when one considers the character of the individual elements. The front block is raised completely off the ground by a series of columns. The ground floor consists only of the caretaker's flat and the entrance, small elements set free in the general space. The front face of the block is much modulated by a play of recessed outer glass walls and projecting balconies, and the whole is capped by a curved solarium wall.

The back block, on the other hand, is severe and ruthless; a pure box with a screen of windows over its one surface. Above, in similar severity, are the boys' rooms.

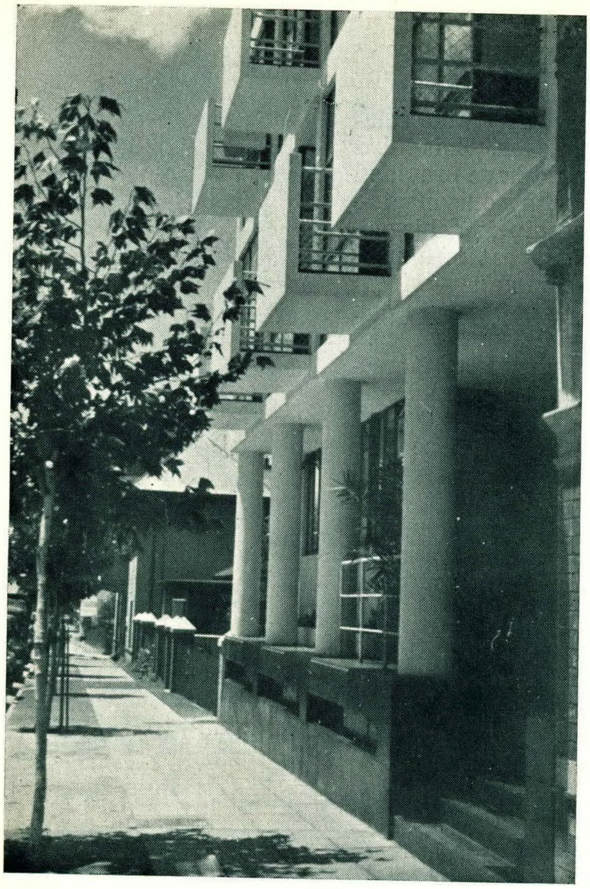
These contrasting elements can only be reconciled by playing the effect on each other of some third element; A and B, unrelated, having value relative to each other only by reference to C, a quantity related to each. This third element is the staircase tower, which, in its thin, tall form, could have provided an "effect" pole to ordinate the other two units. However, by curving the north face extremely delicately, the most powerful relationship is achieved.

This play of three dimensional form is an achievement that is almost unbelievable, when it is considered that it has occurred completely within the limits of an ordinary, internal Johannesburg site. The most that one can usually anticipate is some surface modulation with the possibility of a recess of a few feet on the ground floor, as an indication or suggestion of three-dimensionality (e.g., Peter House, Bree Street). In this respect, if in no other, Aiton Court is a building of note.

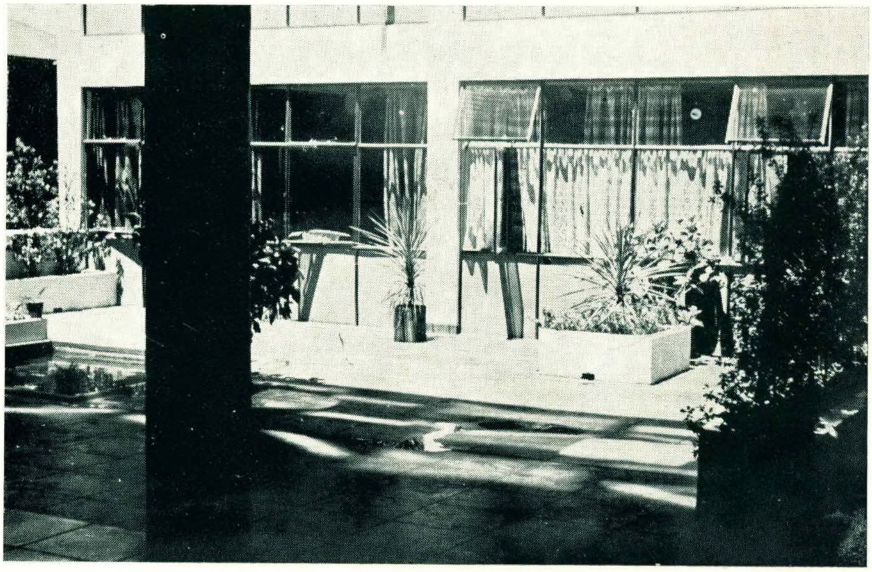
Coming to the inside of the building, it may be useful to trace the study, commencing at the entrance. The level of the ground floor is raised a few feet in order that the basement, used for parking cars, may be lit. The result is that a new fresh plane is established in the building at once removed from the street. One has passed from the public circulation to the more restricted circulation of the flat dwellers. A very formal flight of steps indicates precisely and firmly where the transition occurs.



THE FRONT BLOCK AND THE STAIRCASE TOWER • Photo: Kantorowich



THE ENTRANCE UNDER
THE FRONT BLOCK



THE COURTYARD • Photos: Irvine-Smith

Once on the new plane, a fine sense of spaciousness is felt. A rigid beat of columns is not broken either by the caretaker's flat, which is set freely within the area and is coloured a light buff, or by the glass screen that defines the further enclosure of the entrance hall. The transition from open street to the innermost portions of the entrance hall is extremely subtle; firstly, a roof is the only enclosure; then one has complete enclosure only defined by the delicate glass screen; this is in effect only a transitory experience before the ultimate limitation of solid surfaces around the lift-well is felt.

The treatment of the various surfaces in this " loggia " is such that either one filters through under the low slab and into the great tall space of the garden or one proceeds directly to the lift. This effect of a duality of direction given by the loggia is achieved, on the one hand, by the rake of the side wall of the caretaker's flat, the glass wall and the open floor space, and, on the other hand, by the strong green colour and rough texture of the west wall, with the play of the pivotted wine-coloured door against it. Generally one may say that the loggia fulfils its dynamic and directional purposes admirably.

The entrance hall proper does not succeed quite to the same degree. It has been spoilt mainly by the colouring employed. A strong plane at right angles to the green leading-in wall seems necessary to define the end of the forward movement and change the direction into the lift well and, as the green darkens as one proceeds further in, one feels that a brilliantly light surface is necessary for the purpose. The end wall, however, is coloured in a very dead grey which gives a dullness to that part of the building quite out of keeping with the general sparkling character of the remainder.

The courtyard itself is a really delightful piece of planning. It manages somehow to avoid the artificial paved look to which one is usually accustomed. This is due to several factors. Firstly, sun pours into the space, giving it a definitely cheery aspect quite different from the soil-pipe ridden, bleak, red grano courtyards that one usually finds in city flats. Further, the client, with much foresight, has filled flower boxes and fishpond with vegetation, so that the flat dwellers have a garden, although common to all, which they may rest their eyes upon. The success of the courtyard is amply proved by the fact that the back flats, looking on to the courtyard, " sold " much sooner than the front ones, which look on to the public street.

The living cells are of two types—one-roomed flats and single furnished rooms. The flats are simple in design, consisting of a formal entrance hall which leads to the bathroom and a large living room, in which is planned the kitchenette portion, separated by fittings and curtain. The form of the fittings and the kitchenette they enclose, appear slightly arbitrary and heavy in the main volume. One, however, is unable to say how the arrangement could be improved. Keeping the fittings lower would certainly have lightened the character, but would have allowed a rather large proportion of cooking odour to permeate the living room. A generous sweep of window across the north wall floods the flats with light and somehow gives the impression that the room is much larger than it really is. Disconcerting alternations of dark and light patches at the window wall (and their consequent feeling of prison-bar oppressiveness), caused by small areas of walling separating isolated window units, are avoided, by carrying the windows right across from one lateral surface to the other.

Detail treatment within the room is nicely handled, and one can mention particularly the skilful handling of usually clumsy concrete construction, and also a neat fireplace and bookshelf fitting.

The single rooms occupy the upper floors of the back block, and here there is a difficulty that has not been satisfactorily overcome. In the width, below are three flats and directly above, four rooms. The architects have compromised in this awkward 3:4 relationship by carrying the structural framework up and varying the window treatment. One feels that a more organic expression of two entirely different elements might have been achieved. This, however, would necessarily be at the expense of the very pure forms of the back block mentioned before.

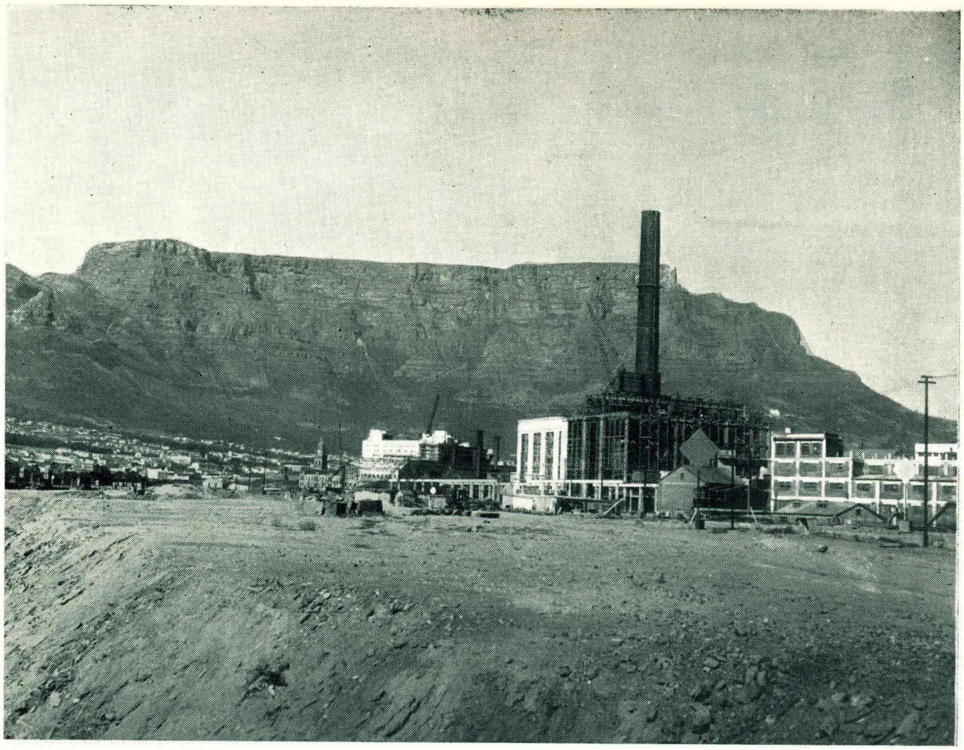
The exterior handling of the building is good. Its success relies mainly in the handling of window units. The regular squaring over the back block, the small squares on the soaring staircase window, and the alternate flush and recessed units of the front block, are three window treatments calculated to accentuate the relationship between the forms on which they occur.

The frames of all the north windows of the flats and rooms are picked out in a deep terra-cotta colour., while the lower solid panels are steel blue.

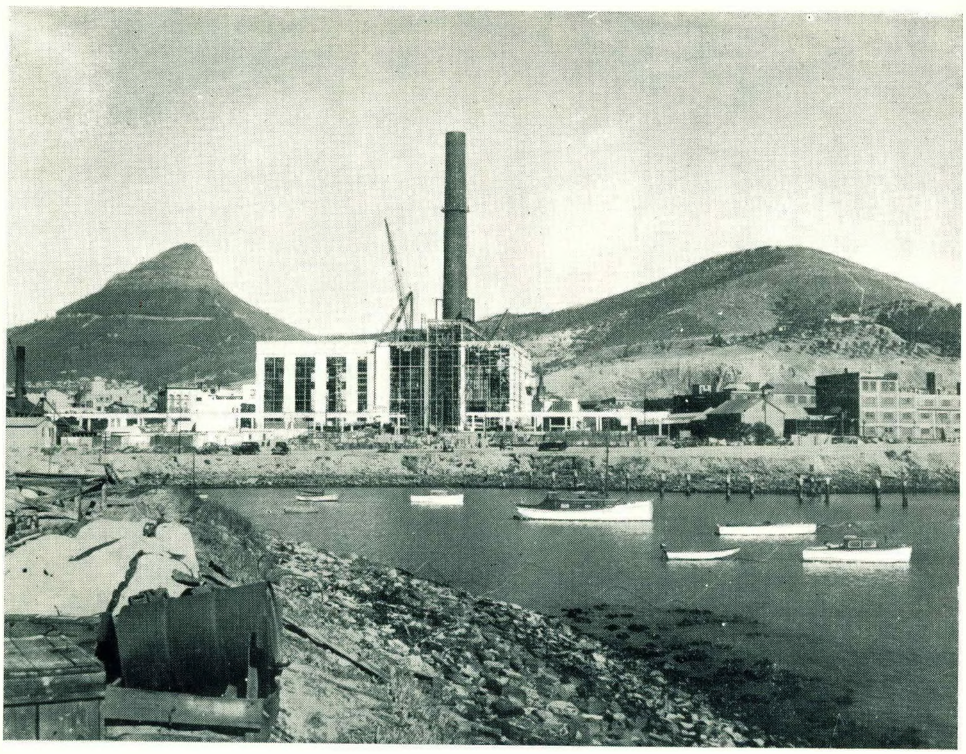
There is one element which one finds worrying. This is the solarium, which is rather limp and formless in shape, and is, furthermore, pierced rudely by an opening along its slowly curving surface. More disturbing still is the fact that this essentially two-dimensional screen is picked out in a pale green exactly similar to that which colours a very cubic and three-dimensional boys' room on the roof. The relationship between the two units that is obviously implied is not apparent.

For the rest, one can only say that the building is refreshingly clean, vigorous and colourful. The treatment throughout is purposeful and succeeds meritoriously in evoking the well calculated response from the onlooker. Any criticisms that have been made are only on the higher architectural planes and take effect only after one has realised the achievements of the building which lift it quite out of the ordinary run. Criticism takes place only after one has assigned to Aiton Court the position of being one of the few Johannesburg buildings of any architectural merit at all, for which fact one must congratulate the architects, who have produced a building of architectural beauty, and also, very definitely, the client, who was broad-minded enough to allow such a proposition as a building of this civic value ever to be built.

OPPOSITE: FACADE DETAIL ● Photo: Kantorowich



THE NEW POWER STATION AND ITS CHIMNEY



The Municipality of Capetown seems determined to destroy the beauties of the wonderful site provided by nature as a setting for its city.

In an earlier article, referring to the foreshore scheme, we pointed out how the new Power Station would effectively block the streets to the west of Adderley Street.

This has now been achieved, and the City Fathers are priding themselves on having erected the tallest chimney in Africa. The engineer has again won the day. Not only has the superb silhouette of Table Mountain been destroyed by the erection of a cable station at the top, but the view of the mountain from the docks has been permanently ruined by this recently erected structure.

Not that we object to the design of the chimney. It is essentially functional and we would prefer to see it as it is rather than clothe it in the trappings of some bybone period of architecture, as so often happens.

But why put it just there? Surely some site could have been found, further east, and in close proximity to the railway and industrial areas.

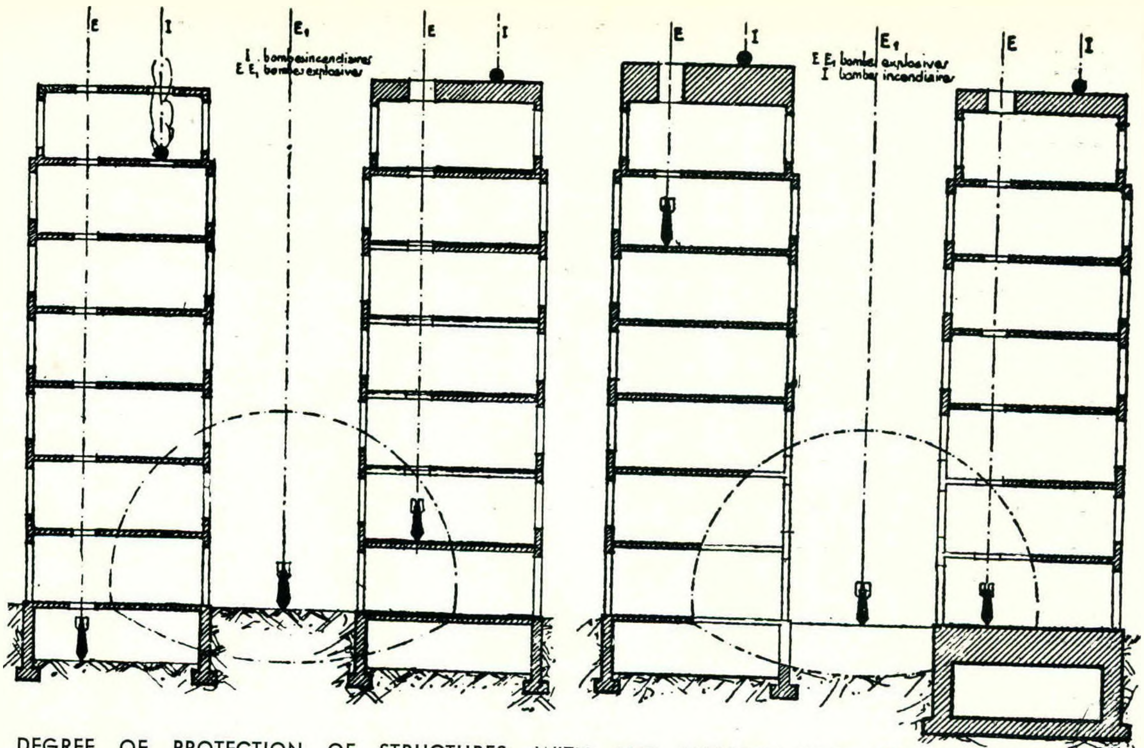
Presumably the coal required will have to be hauled across the main street of the city.

A recent visitor from overseas is said to have remarked when viewing the chimney from the deck of the mail boat: "And they plank it between us and one of the finest views in Africa—or anywhere else in the world. Is there no way of getting the public out here to stop things like that?"

That is the crux of the whole problem. How are we going to stop such vandalism unless the Government follows the lead of other countries and sets up a Fine Arts Commission? We in Johannesburg, an essentially materialistic and industrial community, lacking the amenities of our coastal cities, are not surprised when things like this happen in our midst, but we have a right to protest when such sites as that of Capetown, the mother city, the centre of culture, and the seat of Government, are slowly being destroyed through apathy on the part of the public. What can one, then, expect from communities in the back veld, when their representatives in Parliament are being educated in this way?

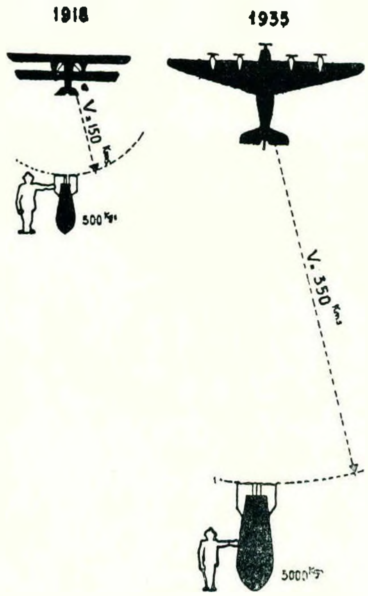
We may yet live to see the day when the cliff-like face of Table Mountain is used for election posters or trade advertisements.

G.E.P.

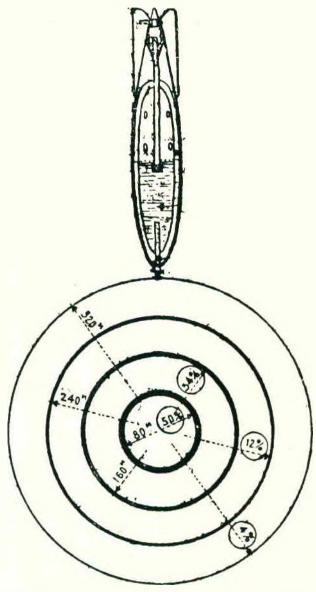


DEGREE OF PROTECTION OF STRUCTURES, WITH AND WITHOUT STEEL REINFORCEMENT; WITH AND WITHOUT A SHELTER, ABOVE AND BELOW GROUND, AGAINST EXPLOSIVE AND INCENDIARY BOMBS.

1. Protection nil.
2. Against E : relative; against E_1 : nil; against I : absolute.
3. Against E : relative; against E_1 : nil; against I : absolute.
4. Protection against E E_1 I : absolute.



COMPARATIVE DESTRUCTIVE FORCE OF AIRCRAFT 1918-1935.



RELATIVE ACCURACY OF INCENDIARY BOMBING.
100 projectiles released from an altitude of 2,000 metres.

With acknowledgments to L'Architecture D' Aujourd 'Hui. December, 1937.

AN INVESTIGATION INTO WAYS AND MEANS OF RENDERING BUILDINGS, BOTH DOMESTIC AND COMMERCIAL, PROOF AGAINST BOMBING AND GAS ATTACKS, WITHIN PRACTICAL LIMITS, WITH SPECIAL REFERENCE TO LOCAL CONDITIONS IN SOUTH AFRICA.

A THESIS BY MARK G. HUSSEY ● UNIVERSITY OF CAPETOWN

PART ONE.

PRELIMINARY REMARKS.

The consideration of the proofing of buildings against gas and bomb attacks in such a way that it is an integral part of the construction, is a matter requiring the urgent and immediate attention of all those in any way connected with the architectural profession.

It remains an undisputed fact that wholesale bombing and gassing of the civilian population with a view to terrorising nations into submission is now an established policy of war. This is especially so in the case where the nature of the country would render a war long and expensive : for recent reference one has only to glance at the conquest of Abbysinia, in which matters were speeded up by the flagrant use of gas, the wholesale massacre of noncombatants in the Basque Area in Spain and the recent shocking bombing of civilians in China.

In a country of such rough terrain and one so extensive as South Africa, a war of conquest would entail perhaps years of guerilla warfare for the attacking forces, the final issue remaining possibly in doubt for a considerable time. This is not to be considered in modern warfare, particularly in the methods adopted by the Governments of "dictator" countries, to whom a speedy, smashing and sensational victory is essential.

This very definitely entails the bombing of the capitals or principal towns either to paralyse the administration or reduce the people to a state of terrified submission. The protection offered to citizens from such bombing and gassing will prove a vital point in the success or failure of such demoralising raids.

At present the principal attempts made at offering such protection in other countries have been the provision of gas masks, preparation for the establishment of treatment centres for casualties, and arrangements for the decontamination of buildings after attack. In two countries only have attempts been made to provide protection by means of large scale gas proof shelters. The focal point of present defence policy is the efficiency of the gas masks and the pre-supposition that the supply of respirators is adequate and efficiently controlled. It is this very essential point that is the subject of the hottest contention among those best qualified to give an opinion on the matter.

Opinions vary from the rather far-fetched statement that the British Government has produced a mask capable of giving absolute protection against any known gas that could at present be used in warfare to the recently published press statement by Dr. Stone that the present gas mask is "practically useless." He stated "The British Government must have known that the gas protection instructions which they have issued are almost futile. The reason why this fact was not admitted and why the results of the Government tests were never disclosed is that they wish to avoid panic." Such a statement by an authority like Dr. Stone behoves our considering at the outset whether gas protection should be dependent on masks, or whether complete protection by means of gas and bomb proof rooms under conditions of comparative safety and comfort should be provided.

At the outset it must be realised that although gas-masks are produced by various private firms in collaboration with the British Government (see Appendix 1), specialists in the work and extensive experiments and tests have proved that absolute reliance cannot be placed on respirators of even the most advanced type.

It must be borne in mind that of the 216 generally known gases, there are at least eight against which no known respirator is at present effective (see Appendix 2). Even in those cases in which masks are noted as providing complete protection, the manufacturers specifically state that should the masks be in any way damaged, or even old (their deterioration is rapid unless the greatest care is taken of them) the effectiveness cannot be in any way guaranteed and the protection is only partial. This in itself is an extremely disconcerting fact. Further to this, however, there are known gases which penetrate or partially destroy rubber, glass and metal. If such gases are used in combination with other non-penetrative but lethal gases, the corroding effects of the penetrative gas will eventually admit the lethal gases and render the mask only partially effective, if not altogether useless. The writer has been through a respirator test in a test-tank filled with Tear Gas and wearing the official civilian respirator. The amount of gas the mask admitted was sufficient to induce sickness after ten minutes exposure, while the sensation of choking was almost unbearable.. There are several gases which are made up with the express purposes of inducing panic, and excessive coughing and choking. The smallest amount of such gases penetrating the mask cause the victim to tear if off.

It is necessary, therefore, from the above brief investigations and from statements made by members of the Air Raids Precautions Department to the writer in London, that, if in any way possible, some effective means for complete isolation from the gas in the actual buildings normally occupied must be obtained to provide safety from the non-combatants till danger is passed and the streets and properties be declared free from contamination.

The general method of attack on a city is briefly this :—The attacking forces despatch bombing planes which attempt to break the windows and crack the walls of buildings with explosive bombs. Gas bombs coupled with explosive and incendiary bombs are then dropped to spread the gas into the partially destroyed buildings, and destroy the buildings still further. The writer visited a number of buildings in England during the past year which had been prepared by the Air Raids Precautions Department as giving adequate protection against gas attacks, and it is his firm opinion that the protection they offered was only partially effective, for reasons stated later.

The present outlined scheme adopted in England is shown on the accompanying drawings.

It is the intention, therefore, of this Thesis to investigate the possibility of rendering buildings proof as far as possible, in the first place, against damage from aerial bombardment by explosive and incendiary bombs; once this protection is offered, to then render these buildings or a part of the building safe against gas, using the gas mask as a last resort only. The subject, therefore, divides itself into the following sections:—

1. BOMBPROOFING :
   - (a) Incendiary bombs : Protection from direct effects thereof, isolation of buildings struck, treatment for fireproofing of buildings.
   - (b) Explosive bombs : Investigation as to the possibility of the protection of buildings against oblique hits, concussive effects due to distant hits, etc.
   - (c) Aerial torpedoes : Protection against distant hits, and concussive effects further to the last paragraph.
2. General considerations of the protection of buildings outside the province of the above parts. (These investigations cover both commercial and domestic dwellings.)
3. GASPROOFING :

   In general, an investigation into the effect of the various types of gases likely to be met with will be considered in an appendix, the effects of such gases on buildings and building materials only being considered, and the possibility of protection against damage.
4. The consideration of individual shelters : comprising :—Air space required, time limits for isolation protection of contamination by persons entering, protection against collapse by outside concussive forces, and the final decontamination of buildings after the gases have dispersed.
5. The construction of shelter in buildings employing large numbers of workmen who require immediate protection on the spot. In this connection it will be necessary to investigate some means of immediate decontamination of all essential services which require a minimum time of stoppage and for which immediate occupation as soon as possible after attack is essential.
6. Decontamination of buildings, areas and building materials : This most essential service must be rendered before the populace can use the streets or emerge from their bomb and gas proof shelters.

The Thesis is, therefore, divided into the above six headings, Appendices being given at the end, containing detailed information for reference purposes.

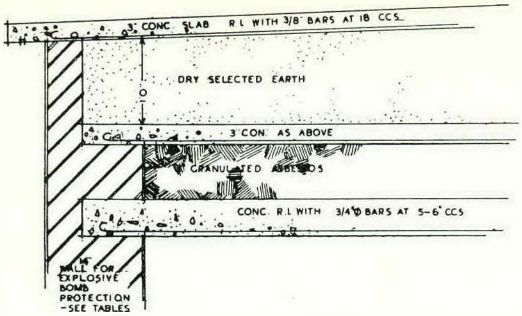
SECTION ONE : PROTECTION AGAINST BOMBING.

INCENDIARY BOMBS.

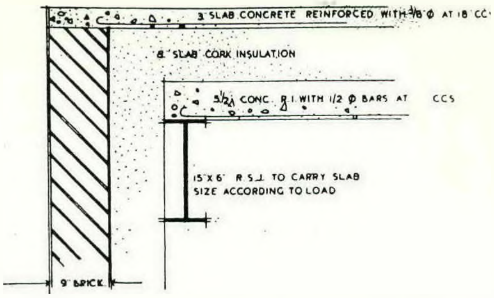
The incendiary bomb is probably the only bomb for which any degree of protection can be given against a direct hit. It is briefly a bomb which contains in itself both a highly inflammable substance and the necessary oxygen producing components for its explosive combustion : that is, the bomb upon exploding is not dependent upon the atmosphere for its burning, and, therefore, literally cannot be put out. Water only increases its rate of combustion—to such a dangerous degree that an explosion may ensue ; sand does not smother it, if completely covered with earth it is merely "choked" and the flames will spurt up out of the soil. The only form of protection, therefore, is to isolate it in such a way that it may burn itself out, affecting the surrounding building as little as possible. This form of protection must of necessity be an integral part of the building construction, as existing roofs cannot be suddenly made bomb and fire proof.

The British Government handbook advises the laying of earth over the top floor surface of the building. This is not greatly practical as the earth would be free to pour through any cracks or holes, and would definitely fail to be a certain safeguard were portions of the floor to crack and fall away due to the excessive heat generated by the bomb.

An insulator from this heat is required in addition to this sand layer, as the amount of heat given out from the incendiary bomb, whether covered by sand or not, will crack six inch concrete after seven minutes exposure. The Air Raids Precautions Department suggests the use of a long handled scoop to remove the burning bomb from its position. As the bomb cannot be approached without special protective clothing, owing to the intense heat, even presuming that it was accessible, and presuming further that the persons present were cool and collected, its removal appears to be a matter of the greatest difficulty, if not almost impossible.



A SUGGESTED ADAPTION OF THE ABOVE FOR INSULATED PROTECTION FROM INCENDIARY–BOMB FIRES



SYSTEM OF HEAT INSULATION ADOPTED IN REFRIGERATION ENGINEERING IN UNIVERSAL MODERN PRACTICE

It becomes imperative that some means of insulated protection be provided as part and parcel of the roof construction itself.

The construction at present adopted by cold storage plants throughout the world for insulating chill rooms from outside heat lends itself admirably to adaption.

The system adopted in this country and America in latest practice is as follows:—Upon the top of the 5 inch concrete slab which forms the floor/ceiling, there is placed a layer of 8 inch slab cork. The 5 inch slab is reinforced to stand the weight of the floor (generally about ½ inch dia. steel at 6 inch centres). On top of this is placed another layer of 3 inch concrete, lightly reinforced (⅜ inch dia. at 18 inch centres). This provides a firm and completely insulated ceiling/floor through which there are no losses of heat. (Only approximately one British Thermal Unit per sq. ft. per day). The heat given out by an incendiary bomb is, of course, very great, but if "choked" by a sand layer, only 100 B.T.U.'s per minute per square foot penetrate downwards.

It would appear, therefore, that if the system adopted by refrigeration experts were expanded and adapted as follows, a reasonable degree of protection against direct incendiary bomb hits might be obtained

One such adapted protective floor per house (or for one room per house), should suffice. The construction is as follows:—Commence the protective floor with a 6 inch layer of concrete, adequately reinforced, say with ¾ inch bars at 5 inch centres. This would stand the shock of an incendiary bomb of 5 litre falling from 300 feet, as a direct hit.

(Note.—There is no downward explosive force of any great amount to be considered. The actual force of any 5 litre bomb falling that distance is calculated thus: A 5 litre bomb has capacity of 9 pints at approximately 1.12 lbs. per pint—say 10 lbs. falling 300 ft. with no initial velocity downwards other than the accumulating momentum. The Kinetic energy after falling 300 ft. at 32 ft. per section would be: $wv^2/64.4$ i.e. 10 x 3,000 (average velocity^2) i.e. 30,000/64.4 says 500 lbs. Taking its force of blow on the protective floor as double this amount, say 1,000 lbs., the 6 inch slab reinforced as above will amply suffice).

Having this protective floor which prevents the bomb penetrating to the room beneath, we have to insulate the slab from the excessive heat generated by the bomb. Adapting the cold storage method but using 8 inch of granulated asbestos in place of the cork, we have an insulating figure of about 150 B.T.U.'s per minute (downwards). This will amply insulate a 5 litre incendiary bomb, IF DAMPED. About 1 ft. 0 inches of dry earth would adequately "damp" such a bomb, provided as little air as possible reached it. This damping can be achieved by a 1 ft. 0 inch layer of sand covered by a 3 inch slab of reinforced concrete, as illustrated. This gives a 3 inch protective slab, which would break the force of, although it would be penetrated by, an incendiary bomb. Once through this the bomb would commence to burn, but it would be in the layer of sand, thus being sufficiently "damped" to prevent the heat being too great for the insulating asbestos; the asbestos in turn preventing the heat being too great for the 6 inch concrete. A reasonably certain degree of protection would thus be obtained.

It must, of course, be realised that in practice the effect of the bomb might differ from the above theoretical supposition, but the margin of safety allowed in the construction shown is sufficient to provide for all but quite exceptional circumstances, as far as can possibly be foreseen without actual experiment.

The structure thus protected would naturally be best served by a flat roof, with the top layer drained off to a fall as illustrated.

Consideration as to whether this is within the bounds of possibility as regards expense, is gone into in Appendix 3.

The matter does not rest here, however. The purely explosively destructive bomb has to be next considered and protection provided—as far as possible—against this.

HIGH EXPLOSIVE BOMBS.

High explosive bombs may be expected to weigh anything from 250 to 3,000 pounds. The higher weights are not likely to be used in normal bombing activities, as their use is generally confined to attack on a fixed objective, and only one 3,000 lb. bomb is loaded on each major bomber. The medium weight bomb—of 500 lbs.—is the one most likely to be encountered.

These bombs can be designed to burst on contact with a hard surface, or to penetrate a considerable distance before bursting. The latter type of bomb would penetrate an ordinary building before exploding, though contact with a steel or stone structure might serve to deflect the path of the bomb or to explode it prematurely : reinforced concrete of exceptional thickness might cause the bomb to explode before penetration.

It has to be regrettably acknowledged, however, that there is no practical means of protection against a direct hit from a modern high-explosive bomb. To attain any certain degree of protection requires a 35 ft. depth of solid concrete, or a 100 ft. depth of earth (these figures being given by the Air Raids Precautions Department). Such construction is impossible of general attainment.

Direct hits, however, only cause a very small proportion of the damage done. Damage is mainly brought about by the blast of the explosion and by fragmentation of the shell of the bomb which results.

Regarding direct hits, therefore, as regrettably unavoidable casualties which reluctantly have to be faced, we have to consider the protection of buildings in the immediate vicinity of an exploding bomb—that is, we have to guard against the damage done by 500lb. bombs which explode not less than 50 feet away. The following thicknesses of materials will afford protection from the blast and splinters of such an explosion :

MATERIAL.	THICKNESS.	REMARKS.
Mild steel plate	1½ ins.	Special steels give a greater resistance.
Stock bricks in cement mortar	15½ ins. hollow 13½ ins. solid	2 ins. cavity to be open.
Unreinforced concrete not weaker than 6-1	15 ins.	Normal structural concrete.
Reinforced concreete	12 ins.	Normal reinforcement.
Reinforced concrete	10 ins.	Specially reinforced to stand the punching shear effect of splinters which induces tensile stresses between the front and rear faces of the concrete wall. Rectangular links (connecting front and back reinforcement) of ¼ in. dia. rods at 12 ins. centres is a suggested arrangement which has been tested successfully.
Sand or earth or coal dust revetments	2 ft. 6 ins.	This should be the minimum thickness, for example, at the top of a traverse or revetment.
Coal (lumps)	2 ft. 6 ins.	
Shingle (or ballast revetments between wood or C.G.I. sheeting)	2 ft. 0 ins.	A sandwich of shingle between sheeting.
Shingle revetments contained between steel plates. Front plate ¼ in. and back plate ½ in. in thickness	10 ins.	

Taken from the A.R.P.D. official instructions.

From these tables it would appear that if the outside walls be 14 inches thick, this will provide reasonable protection from bomb explosions within not less than 50 feet. Two nine inch walls with a two in. cavity would give certain protection from the splinters, concussive effects and flying debris of bombs of larger calibre. As these concussive forces generally act from the ground, the roof construction is not affected, and requires no further modification from the previously considered roofing arrangement for incendiary bombs.

Protection must be considered, however, for the wall openings—windows, doors, air vents, etc. Protection for both windows and doors can be obtained by the use of steel shutters hung so as to close outside, after the fashion of ordinary shutters, but with inside fastening. These should be of 1½ inch mild steel plate and must lap 3 inch round the window opening. A little thought in design could make attractive features of these shutters.

PROTECTION OF DOORS.

The system advocated by the Air Raids Precautions Department is the banking of doors by an outside wall of sandbags or sand-boxes as follows :—

The sandbags are banked from 4 ft. 6 inch at the base to 2 ft. 0 inch minimum at the top, bonding them as can best be achieved by the changing of the bags, end-on or side-on, leaving a 2 ft. 0 inch wide access to the door.

While attaining its purpose, this method still allows of concussive effects reaching the door, and is only a protection against splinters and debris. There is an added danger that the door may be blocked by an explosion forcing the sandbags against it.

Such a construction could not remain permanently in front of the entrance during peace time, and it would be extremely difficult to arrange the protection in haste in the event of a sudden raid.

It is, therefore, desirable that the door protection be part of the door construction itself, functioning as a normal door during peace time, but forming a perfectly adequate protection against concussion and splinters during air raids. This could be admirably achieved by having a laminated steel door, using 1½ inch mild steel plate as the centre reinforcement. It will be noted that this door should be arranged so as to fit with a 3 inch lap over the outside of the door opening (as for the windows, with inside fastening) otherwise it will be blown into the room as a solid block by any bomb bursting near it.

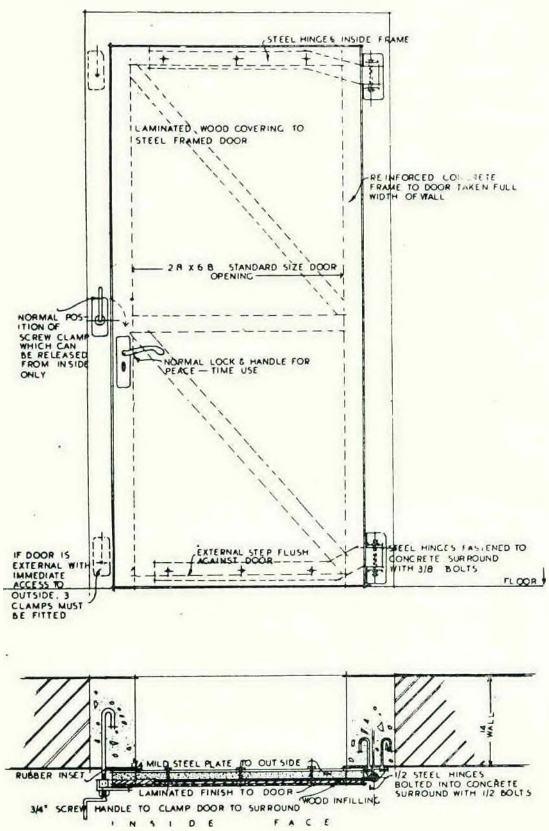
Suitable care in design would make these doors an attractive feature of the building or room concerned.

AERIAL TORPEDOES.

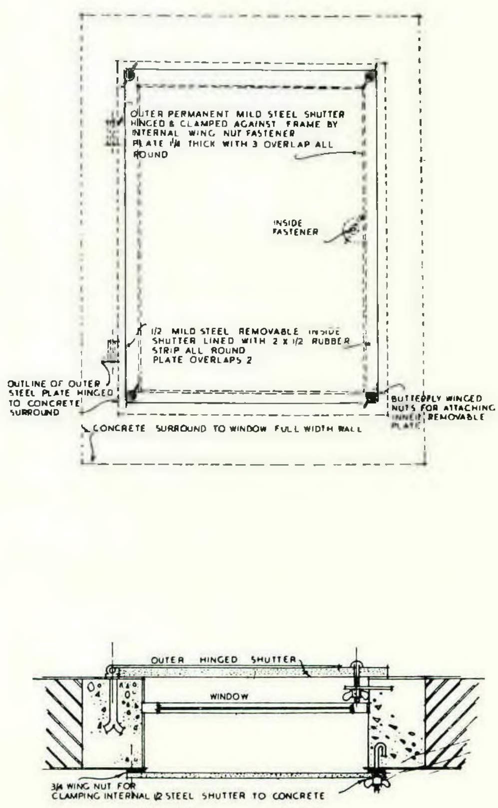
As regards aerial torpedoes, the same conditions apply as for the heavier weights of explosive bombs. They are used for a definite objective, such as ammunition works, administrative centres, etc., and would not apply to civilian or "terrorist" bombing. In any event, such torpedoes have such terrific explosive power that it is not practicable to attempt any method of defence for the general public. Direct hits would simply have to be unavoidable casualties.

As regards defence against the damage due to concussive forces, splinters and flying debris, the previously considered precautions would again be effective, except that the range of "direct hit" would not be limited to a radius of 50 feet. One hundred and thirty feet would have to be regarded as the effective extent to be considered as a direct hit.

We thus have a possible means of providing reasonable security, within practical limits, against incendiary bombs, explosive bombs of medium weight (other than direct hits), the concussive effects of the larger weight bombs and aerial torpedoes.



ELEVATION & PLAN OF PROPOSED CONSTRUCTION OF GAS- & BOMB-PROOF DOOR FOR GENERAL USAGE



PROPOSED PROOFING OF EXTERNAL WINDOWS AGAINST GAS & BOMB PENETRATION

SECTION TWO.

GENERAL PRECAUTIONS THAT WILL ASSIST.

As the explosive and incendiary bombs penetrate considerably before exploding, the effects of non-direct hits will be substantially reduced if the bomb falls into soft ground. It is thus advisable that buildings, as far as possible, be surrounded with an area of well ploughed land, normal flower gardens (if kept well turned), or cultivated ground. Note.—Lawns and gravel stretches are not advised.

All known weaknesses in the buildings being prepared for bomb-proofing should be attended to, such as large window surfaces, drain outlets, ventilators, etc.—in short, any surface which would be blown in by the concussive effects of a bomb explosion must be eliminated or protected.

The writer's reason for having dealt with this matter before investigating the far more important subject of protection against gas attacks is this : Although bombing by explosive bombs will only cause a small percentage of the damage compared with the deaths which will result from gas bombing, it is an essential prelude to the actual use of gas. The buildings affected by explosive bombs will be damaged in some way or other (that is, the buildings not specifically designed and adapted to withstand such concussion). This damage will nullify all attempts at gas-proofing which may have been made, and render the so-called gas-proof rooms death traps.

It was particularly impressed on the writer's mind when having interviews with various members of the British Air Raids Precautions Department in London, and when visiting " proofed " rooms and dug-outs, that the proofing against gas which had been undertaken or advised, almost completely disregarded the essential fact that the smallest concussive shocks would render such precautions useless, or very ineffective.

The official instructions issued by the British Government will, therefore, be first considered, the essential points of weakness eliminated and an attempt made to improve upon them.

SECTION THREE : GAS PROOFING.

EXISTING BUILDINGS.

The effects of the various types of gas likely to be encountered under local conditions is contained in Appendix 4, where it deals with the effect of the gases on building components. It is only necessary to refer to this appendix at suitable points.

In dealing with the protection of existing buildings, it will be evident that this must form the major part of any gas defence scheme at present, as it will probably be many years before any radical attempt is made at the actual construction of gas and bomb-proof buildings.

Gas attacks may be made by means of bombs or spray. If the former are used, the gas will be liberated where the bomb explodes, whereas the gas discharged by spray will descend in the form of a fine shower of liquid, which may travel with the wind some distance before reaching the ground.

The weight of a gas bomb varies, and it may be anything up to 250 lbs. or even larger. The poison gas content would normally account for more than half the weight of the bomb.

Gases may be divided into two main types (i) non-persistent and (ii) persistent.

Non-persistent gases when liberated are rapidly diluted by admixture with the air, and the period for which they continue to be dangerous is dependent upon the atmospheric conditions. Examples of such gases are chlorine, phosgene, and the poisonous smokes derived from various arsenical compounds.

Persistent gases (for example, mustard gas) usually consist of a contaminating liquid which will continue to give off poisonous vapour for many hours or even weeks, unless counter-measures are taken.

In providing protective measures against air attack, the object is to prevent the gas, in liquid or vapour form, from penetrating into the building or shelter which it is desired to protect; and this is achieved by making the shelter air-tight.

The following extract is taken from the British Government official instructions (Handbook No. 6, " Precautions in Factories and Business Premises " p. 7).

" Air attacks can be delivered with great suddenness and it would be impossible to improvise the necessary precautionary measures at short notice. It is essential that a survey or the various measures to be adopted should be made at the present time, and that all necessary preliminary arrangements should be made to enable these measures to be put into force without delay."

SELECTION OF ROOMS IN EXISTING BUILDINGS.

In each house a room or rooms should be prepared to prevent the entry of gas, so that it may be safely occupied during a raid in which gas is used. The room to be protected should, therefore, be selected on the following principles :—

(1) A cellar or basement is best, always provided that there is no risk or flooding and that alternative means of exit exist.

(2) If there is no basement, choose a room on the ground floor.

(3) The windows of the rooms should be small and if possible not in an exposed position. If they face soft ground, the blast of an exploding bomb will be more smothered than if they face a paved or metallic surface. The glass will in any case be liable to be broken by the explosion of high explosive bombs, even at a considerable distance, and some other covering will have to be fastened over the window frame.

(4) Where possible, the room should be on the side of the house least exposed to the prevailing wind. Wind pressure will assist the entry of gas through small crevices and ill-fitting window frames.

(5) The entry of gas into a house is always assisted by draughts, so it is important to shut all doors and windows throughout the house before withdrawing to the gas-protected room.

(6) Apply the general gas-protection instructions to the whole house so far as possible, after paying special attention to the selected room. If the penetration of gas into the house is reduced to a minimum, the occupants of the protected room will be all the safer, and a great deal of trouble will be avoided because the house will not subsequently need decontaminating to the same extent as if the gas had penetrated freely into the interior.

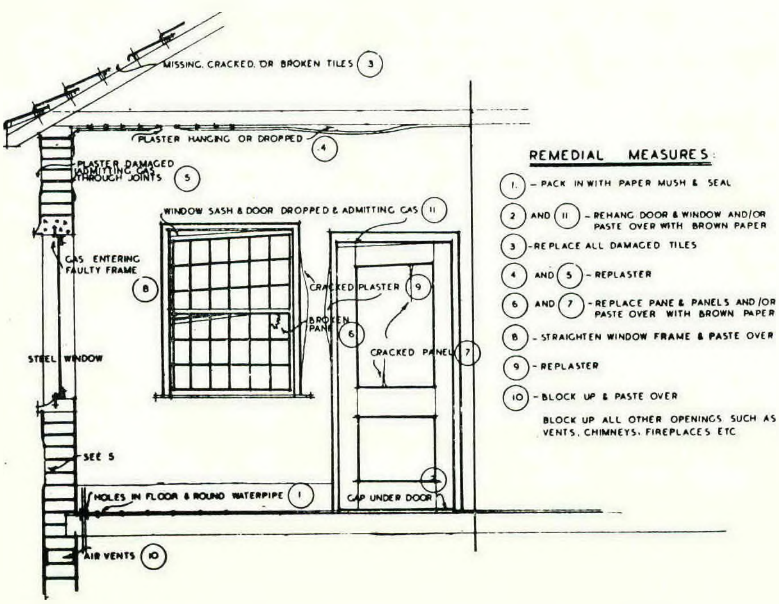
The number of people who can safely remain in unventilated rooms for any prolonged period is naturally limited. If a room contains too many people, the first trouble will not be shortage of oxygen or increase of carbon dioxide, but intolerable discomfort due to rise in temperature and humidity of the air. The capacity of a room is therefore to be measured, not by its cubic content of air, but by the surface area available for the removal of heat and the condensation of moisture.

Under local summer conditions, closed rooms may safely be occupied for periods up to six hours if the surface area of the walls, floor and ceiling is equivalent to an allowance of 100 sq. ft. per person. The following are examples of how this formula works out in typical rooms.

Size of Room.	Permissible Occupants.
10 ft. x 10 ft. x 8 ft.	5
15 ft. x 10 ft. x 8 ft.	7
20 ft. x 15 ft. x 10 ft.	13
30 ft. x 15 ft. x 12 ft.	20

Note that these calculations are **NOT** based on cubic capacity, which would give different figures.

The rendering of rooms gas-proof is simplified if a quick survey is taken of all points at which gas might be admitted. The accompanying illustration gives typical structural defects against which remedial measures must be taken. The object is to seal up all cracks and crevices through which gas may find entrance to the room, and to provide a gas-proof means of exit and entrance.



POSSIBLE DEFECTS IN NORMAL EXIST. BUILDINGS ADMITTING GAS WITH SUGGESTED METHODS OF REMEDYING CAUSES OF LEAKAGE

AIR LOCK AT ENTRANCE.

At the regular entrance to the shelter an air lock should be constructed, being a compartment with a door to the outside and a door to the shelter through which a person entering the shelter must pass. By having one or other or these doors always closed, the direct passage of air from the outside into the shelter can be prevented.

One method of constructing an air lock is to set up two blanket screens across the entrance passage, so that a person can enter the space between the screens and adjust the fitting of the blankets before passing into the shelter. The screens should be at least 4ft. apart, and preferably anything up to 10ft. apart in a shelter accommodating a large number.

When curtains alone are used at the ends of an air lock, they should rest on a framework inclined some 20 degrees from the vertical, so that the curtain will lie close on the frame. Laths should also be nailed to the curtain at about one foot intervals, to keep the curtain stretched across the opening. If laths are put on both sides (as is desirable), those on the under side should be short enough to lie between the sides of the frame, and those on the upper side should be long enough to rest across the frame. When not in use, the curtain can be rolled upwards and tied to the top of the frame. The curtain can be made of oilskin, or blanket, or canvas, or any other close-woven material. If not itself gas-proof, it should be kept wet, preferably with a solution of chloride of lime, though this is not essential.

If there is a door to the shelter, it can serve in place of one of the blanket screens, provided that it is made air-tight. This can be done by making the door draughtproof with felt or rubber. All keyholes and other cracks should of course be stopped up. Alternatively, two air-tight doors can serve as an entrance and exit to an air lock.

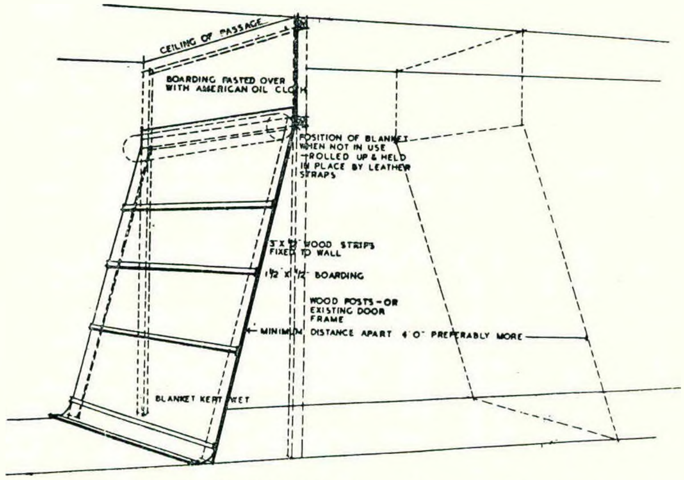
An air lock is used in the following way. Anyone wishing to get into or out of the protected part of the building opens the door or curtain to get into the air lock, and then shuts that door or curtain before opening the one at the other end of the air lock. Each door should always be opened gently and no wider than is necessary.

The air lock must be large enough to hold all the people who need to pass through it at one time, and should have a margin of size to guard against the risk of the further door or curtain being pushed open before the first is closed. Thus the entrance to a building accommodating many people, or to a public shelter, will need a larger air lock than the entrance to a private house. In no case should the space between the two doors or curtains be less than four feet. Where stretchers have to be carried through, the air lock should be 10 feet long.

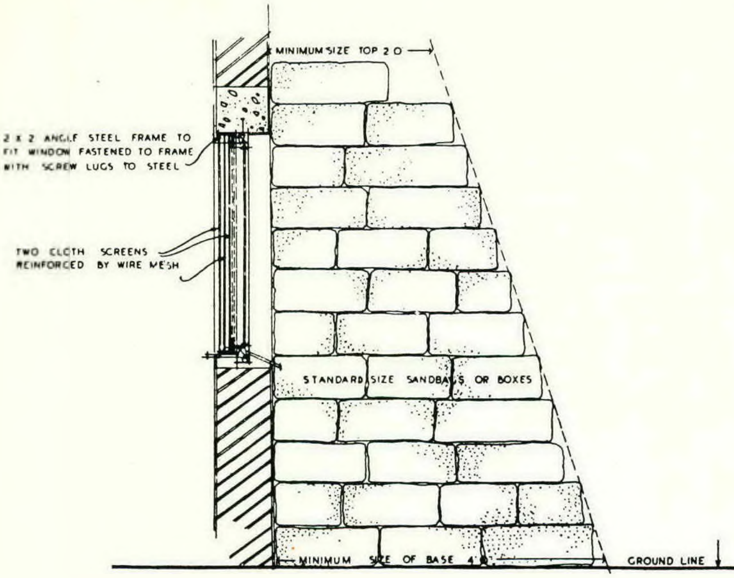
On general grounds, the larger an air lock is the better. It is obvious that, every time the outer door or curtain is opened, a little gas may get into the air lock. The atmosphere in the air lock will gradually get to contain a low concentration of gas, and this will tend to enter the protected part of the building as the inner door or curtain is opened. If, however, the air lock itself is large, the large volume of air which it contains will reduce the concentration of gas derived from the small amounts which enter the outer door or curtain, and the concentration which can penetrate into the protected part of the building will be correspondingly kept low. Therefore, where the space is available, it is better to devote a whole room to form an air lock rather than to build a compartment which is only just large enough for the purpose.

WINDOWS.

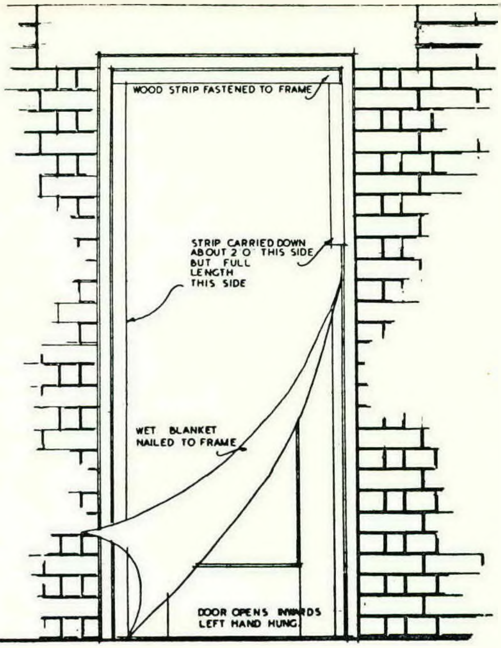
The object of maintaining intact the glass or a substitute for glass in a window opening is, besides keeping out the effects of weather, etc., to prevent poison-laden air entering the room or shelter.



SKETCH SHOWING METHOD OF FORMING AIRLOCK WITH TWO BLANKET TRAPS FOR ADAPTING EXISTING PASSAGES OR NEW BUILDINGS



SANDBAG PROPOSED SYSTEM FOR PROTECTING WINDOWS & DOORS
FROM BOMB DAMAGE AND CONSEQUENT PENETRATION BY GASES



GASPROOFING OF EXTERNAL DOORS
GIVING ACCESS TO STREETS ETC

NOTE.

The air pressure or blast due to the explosion of a high explosive bomb bursting some distance from a window composed of the ordinary type of glass shatters the glass and projects the broken pieces with considerable velocity into the building.

Protection from the effect of blast from a bomb bursting some distance away can be given to glass windows by constructing on the outside sandbag walls or earth traverses 2ft. 6ins. thick between shuttering which must entirely cover the window opening and which must touch the brickwork with an overlap of at least 12ins. all round. Protection cannot be given by fixing wooden shutters of practicable thickness on the outside of the window frame owing to the fact that the pressure pulse due to blast is conveyed through wood shutters to the air behind them, which, being compressed, will shatter the glass.

If sandbag walling covering the window on the outside cannot be used, some provision must be made to block up the window opening in the event of the window panes being fractured or driven in, as the poison laden air must be kept out of the building. For this purpose, it is recommended that a frame (either of iron or wood, but preferably the former because it will not lose its shape) should be kept handy which will fit accurately on the inside of the window, the inner surface of this frame being pressed against the window frame by means of thumbscrews fixed at suitable intervals. Between the movable frame and the window frame a rubber or felt strip would help to make the joint air-tight. In this movable frame are fixed two layers of blanket material reinforced with strong wire netting (½in. mesh) on each side. If, therefore, the existing window is punctured, the blanket window could be quickly placed in position to keep out gas.

In cases where there are difficulties in providing the spare blanket window, it is recommended that an old piece of carpet should be nailed to the inside of the window frame instead.

It will be noted that these last suggestions will not prevent the gas entering if an explosion nearby again occurs, as the blanket frames will simply be blown en bloc into the room.

DOORS.

A blanket or covering of one of the suggested materials should also be fastened over the outside of the door-frame, leaving a flap which can be turned up to allow entrance. If there is a large crevice under the door, a thin strip of wood should be nailed to the floor to form a small step against which the door will fit tightly. Even the keyhole should be stopped up. In many houses it will be found that the windows and doors are so ill-fitting that it is necessary to paste newspaper over the entire surface to render them air-tight. A mush of newspapers and water is useful for stopping up large cracks.

FLOORS, WALLS AND CEILINGS.

All cracks should be filled in, or pasted over with paper, unless it is certain that no gas can leak through.

FIREPLACES.

The chimneys of fireplaces should be stuffed up with paper or rags to prevent draught. Any cracks in the fireplace through which a draught may come should also be sealed.

PIPES, BASINS, ETC.

Any waste pipes or overflow pipes leading to the outside should be plugged, and also any other hole of any kind through which draughts might penetrate.

VENTILATORS.

All ventilators, in the room or below the floor, should be stopped up. It is important that every vent or grating in the building through which air might be drawn to the shelter should be blocked.

The measures of gas protection which are described above may be possible only in the particular room which is to be occupied as a shelter, but it is very desirable to try to keep gas out of the whole house or building. This can be achieved to a great extent by seeing that there are no obvious means for gas to enter (broken panes of glass, open ventilators, etc.), and then keeping all doors and windows shut during a raid.

The more successfully the whole building is kept free of gas, the less risk will there be of gas penetrating into the gas-protected room.

The above precautions are those officially issued by the Air Raids Precautions Department, and in spite of the source from which they originate, the reader will be impressed by their generally unsatisfactory nature—they are essentially temporary measures of a very frail type, likely to be rendered useless by any untoward occurrence, and certainly not those that would inspire confidence and prevent panic.

After repeated discussions with those in authority at the War Office, and considerable thought, the writer cannot help but feel that although these precautions are the best that can be taken in emergency in those buildings already erected, they are far from perfect, and that a systematic construction of gas-proof units as an integral part of both new and existing buildings must be undertaken.

The following outline is therefore suggested.

CONSTRUCTION OF NEW BUILDINGS (and for adaptation where possible in existing buildings).

It is perfectly possible to render an entire house or commercial building incendiary bombproof and proof against concussive effects by means of a protective roof over the whole top floor and wall thicknesses as previously dealt with. It is not, however, so easy to render a whole house gas-proof, besides being somewhat unnecessary. The best method is the construction of a gas-proof unit within a house protected from incendiary bombs from above and shell splinters and concussion from without, by the previously suggested construction.

To such a place the occupants could retire in the event of air attacks without rush or hurry, without any terror-stricken last-minute attempts to provide safety, and remain in comparative comfort and quiet, knowing that, apart from the 1,000 to 1 chance of a direct hit, they are safe from gas and fire and mutilating splinters.

The comparison between the absolute calm and safety of such a system and the most unsatisfactory and unsafe method of wholesale patching as previously outlined, will at once impress the reader.

Such a gas-proof unit is remarkably easy of construction as an integral part of a building. The accompanying sheets show the system to be adopted, and will be enlarged upon here. As it is possible for an attack to last many hours, the gas-proofed room should be in communication with both a source of food supply and sanitary accommodation. To this end the actual pantry, or food store of the house, is designed to lead off the unit, connecting with the kitchen by means of a gas-proofed door as detailed.

Connecting with the unit is a small lavatory, containing an earth closet, of the bucket type, basin, towels, etc. This has no outside means of lighting or ventilation as the number of possible gas entrances to the unit must be reduced as far as possible.

It would be highly satisfactory if the water supply to this convenience could be obtained by means of a tank working on the dribble system to the water supply of the kitchen. This would give us a tank constantly filled with fresh water within the unit so that in the event of an attack, water for both sanitary and drinking purposes would be obtainable without dependance on an outside source of supply (liable to be cut off).

The entrance to the room is obtained by means of a gas-proofed door "a" leading to an air lock with three blanket traps, "b," "c" and "d." At "d" there is a further gas-proof door communicating with the gas-proof room proper. At the little partition formed by blankets "b" and "c" a steel bin must be placed, with a basin and tap from the water supply in the convenience. In the event of a person entering late, after the attack had begun, and having been exposed to the gas and contaminated, he could strip in this area, place his clothes in the bin for later destruction or decontamination, wash down with soap and water to decontaminate his person, and then enter the room proper. This is an essential feature of the unit, and must not be omitted, as it is highly improbable that all who will seek shelter will be actually in the house at the time the attack commences.

The room proper must be fully equipped with blankets, sheets, pillows, small stove or heater, ambulance equipment, etc. (see Appendix 5), and it is suggested that these items remain permanently as the equipment of such a room, so that no last-minute rush to provide the necessary requirements could occur.

The walls of the air lock should be tiled if possible, if not, painted with water-glass. Lighting for the unit (which must include points in the air lock) is optional as regards supply, either a dry battery system or fixed oil lamps being satisfactory.

It will be realised that such a room will have no really useful purpose in peace time. On the other hand, it would cause no trouble, and no inconvenience. At the outbreak (or feared outbreak) of hostilities, a brief check of all the requirements could be undertaken, the shelter prepared to its last details, and all set in order. The occupants of the house would from that time onwards be prepared fully and as completely as can possibly be forseen against that most demoralising and horrible form of modern warfare—air raids.

It will be noted that the entire unit is unventilated. It is not advised by the Air Raids Precautions Department that any outside means of ventilation be adopted, as they are extremely liable to damage and destruction, not only rendering them ineffective, but exposing the room to leaks. The writer has decided to eliminate any such ventilation and provide for a filtration unit in the room itself. Information on such filtration units is being prepared by the British Government in conjunction with various private firms, and although not at present available, will be put before the public immediately upon completion. Such a unit would render a room 12ft. x 12ft. x 10ft. (ht.) available for 10 people for 12 hours in perfect comfort and safety. (This could be considerably increased, however, in case of emergency.)

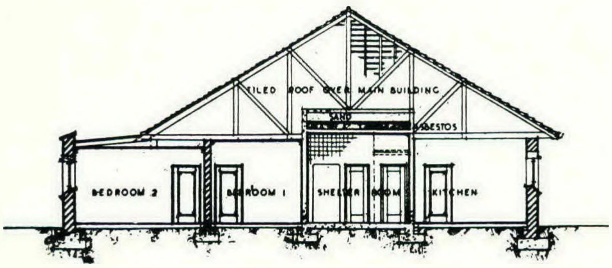
Without such filtration units, the following rules for area apply :

VENTILATION AND ACCOMMODATION.

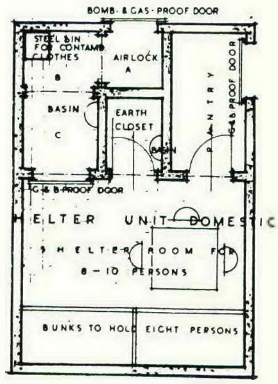
Allow 75 square feet of surface area (floor, ceiling and walls) per person. On this basis shelters may be occupied for periods up to a maximum of six hours. An allowance of 100 square feet of surface area per person would provide for a stay of 12 hours.

For comfort and safety, a minimum of six square feet of floor area per person should normally be allowed. Under emergency conditions where overcrowding may occur the allowance of floor space must never be reduced below $3\frac{1}{2}$ square feet per person.

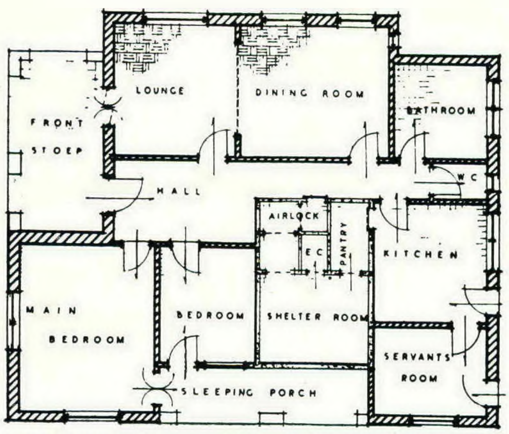
These suggestions apply to the domestic building only. For the protection of larger areas further investigation is required.



SECTION THROUGH A HOUSE UNPROTECTED BY BOMB-PROOF ROOF BUT HAVING COMPLETE SHELTER UNIT INCORPORATED



QUARTER SCALE DETAILS OF SHELTER UNIT ILLUSTRATED BELOW



EIGHTH SCALE PLAN OF SMALL DOMESTIC DWELLING WITH BOMB & GASPROOF SHELTER UNIT AS AN INTEGRAL FEATURE

COMMERCIAL BUILDINGS: PROTECTION OF FACTORIES, WORKSHOPS, INDUSTRIAL BUILDINGS, ETC.

In general the protection of these buildings and the occupants may be summarised as follows:

Buildings: Protection against fire-risk, incendiary bombs and explosive bombs.

Occupants: Provision of adequate accommodation proofed against gas and bombing, either inside or outside the buildings occupied.

Fire risk: In dealing with this matter and with incendiary bombs, the fire risk is especially stressed by the British authorities as being one of the utmost gravity.

The following extract is from the Air Raids Precautions Department handbook for architects on the protection of factories: "Fire precautions in factories, important at all times, are rendered immensely more important when war risks have to be taken into account, for these introduce new factors and call for special precautions which do not enter into the problem in peace time."

Briefly, emergency measures for reducing the fire risk are mainly a matter of intensifying the precautions which ought to be in force at all times, coupled with the introduction of an incendiary bomb-proof layer over the entire top floor of the building. This latter point is quite essential as the futility of safeguarding buildings from internal fires, whilst leaving a possible means of external forces causing fire, will be realised.

Such protective flooring as considered previously for the domestic building will amply provide against the incendiary bomb contingency, while more intensive precautions must be taken within the building for preventing any possible fire from spreading as the result of explosive bomb damage, etc. The following suggestions commend themselves.

GENERAL.

A survey should be made of the more vital parts of the plant to see what can be done to afford local protection against damage by blasts and splinters, especially for machinery, which is essential to the continued working of the factory. Particular attention should be given to steam boilers and to surface pipes of essential water and gas supplies and to the switchboards and cables of electricity supplies. The piercing of supply pipes, besides causing dislocation to the factory, might involve the flooding of shelters or explosions.

The storage of highly inflammable material, such as petrol or benzine in tanks, should receive special consideration. Where this is not already done, plant containing inflammable spirit stores should be mounded so as to prevent burning spirit spreading over a large area. Where there is a large storage on the top floor of a building, it may be an advantage to provide a drainpipe to a sump outside to prevent spirit flowing from floor to floor.

The danger from explosive bombs provides a considerably more difficult problem, as the present system of factory construction entails the framing of buildings in reinforced concrete, with an infilling of light brickwork. Large window surfaces are also the rule in the average modern building, and constitute a considerable danger point. Explosive bombs would tend to damage the brick infilling to a lesser or greater degree, and shatter the glass.

Dealing very briefly:—In most cases sandbags will afford the most simple and effective means of protection; but, as already indicated, wooden boxes filled with earth are an excellent substitute.

Any large area of glass should be protected, by wire netting or otherwise, to prevent scattering of glass if it should be shattered by an explosion.

Where practicable, duplicates of vital key machinery and special fittings should be obtained if not already available, and stored as an additional form of protection. These duplicates should preferably not all be stored in one place, and should be away from the main buildings.

Telephone switchboards and other places essential to communication and control will require protection, also any place earmarked for use as a first-aid post or for some other air raid precautionary purpose.

Such precautions, and others suited to particular circumstances, are the most that can be taken in cases of emergency as regards the buildings themselves. In connection, however, with providing bomb- and gas-proof accommodation for the occupants who would be normally at work therein, a different problem is presented from that of the domestic dwelling.

It is evident that only the with the greatest difficulty could a large factory building, with all its many points of weakness, be rendered effectively gas-proof; for to be gas-proof the building must be air-tight. There is the further danger of the building's collapse due to explosions within or without, which is greater than in the case of a small private dwelling. Such collapse would either kill, maim or imprison the occupants, if protection was provided for them within the building itself.

It is therefore advisable that the shelters for the workers be placed at some point outside the factory itself, but within easy range so that immediate access could be had in time of emergency. It is realised, however, that some factories and industrial plants might be so constructed as to allow of portions being adapted to suit admirably for the protection of the staff, such as those having well protected basements, long corridors, etc.

This would depend on the particular case in point, and a general rule cannot therefore be laid down. The suggestions for a shelter which follow, however, could easily be adapted to such buildings—bearing in mind the necessary precautions to be taken, viz.:

(a) The walls and roof of the shelter should be of sound construction and should be capable of being made gas-proof.

(b) The fewer the openings, such as windows and doors, the better, and the easier it will be to afford protection against splinters and gas. In a shelter of any considerable size it is desirable that two exits should be prepared.

(c) No shelter should be located below heavy machinery, water tanks, or below any structure which might collapse and demolish it, unless the roof is of sufficiently strong construction.

(d) No shelter should be near stores of inflammable material. Proximity to boilers or to numbers of hot pipes should also be avoided, as high temperatures in a shelter are undesirable.

(e) If the shelter has windows it is preferable that they should face another building or a wall, or else soft ground, since there will then be less danger from flying splinters and blast.

(f) There is also advantage in having shelters on the side of the building not exposed to the prevailing wind, which may tend to blow gas through cracks which have not been properly sealed.

(g) An internal corridor may form a good shelter if it can be closed at both ends for protection against gas.

(h) If underground accommodation is available and suitable, additional supports may have to be inserted to ensure that the roof would not collapse if the structure above were wrecked. Particular attention should be paid to the means of exit in case of any such damage occurring, and extra supports are strongly advised round the doors to prevent the exits becoming blocked. It is for this reason that any accommodation of this kind should, if possible, have alternative exits.

PROTECTION OF OCCUPANTS.

In general, collective protection may be provided in any of the following ways:—

(1) By the use as shelters of suitable accommodation in existing buildings;

(2) By trenches or other outside shelters;

(3) By galleries (of the type used in mines) where these exist already or where they can be constructed more easily than special shelters or trenches;

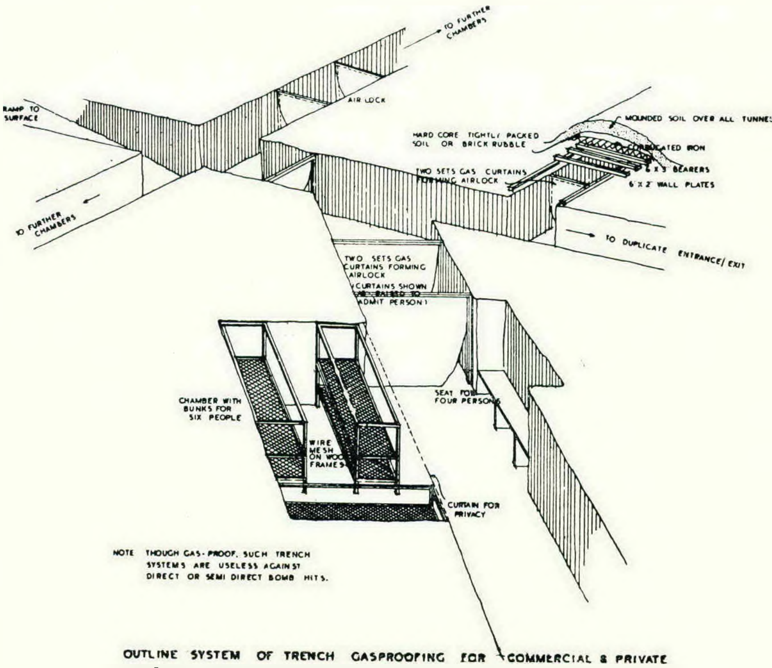
(4) By dispersal;

(5) By a combination of any of the above.

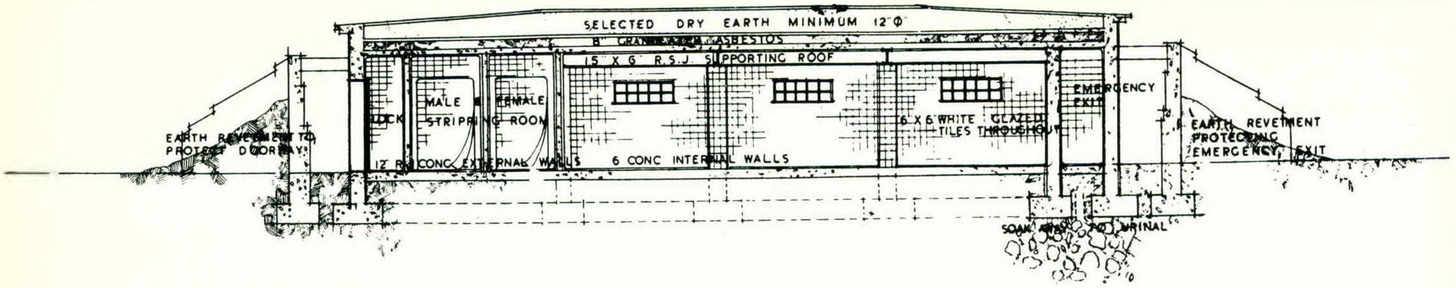
For the purposes of an architectural thesis, it is only necessary to deal with (1). (2) and (3) have, however, been briefly dealt with in Appendix 6, for general interest reasons, although falling outside the scope of the present investigation.

EXTERNAL SHELTERS FOR FACTORIES.

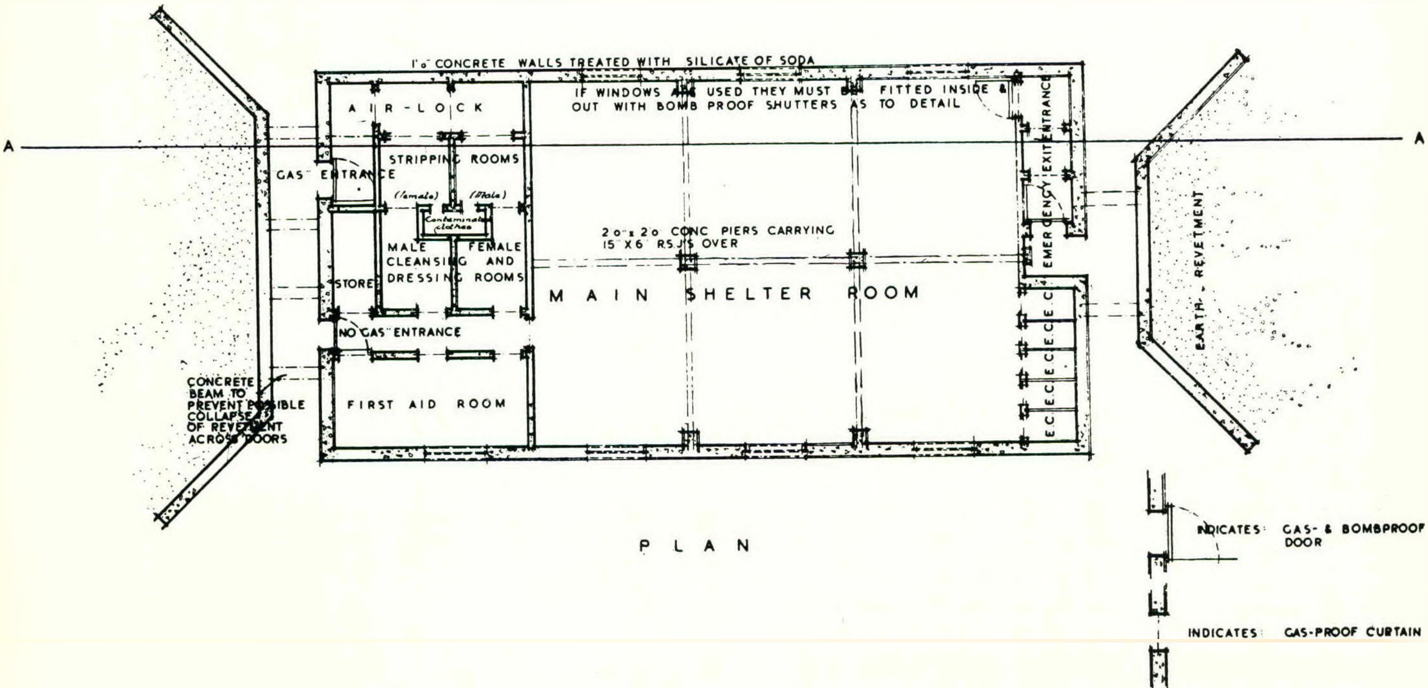
These shelters are based on the plan adopted for the domestic building, having, however, a much greater scope. It has been the aim of the writer to curtail as far as possible any unnecessary expenditure which would render the construction of such shelters prohibitive in cost, while embracing every detail necessary for the complete protection of employees. (Estimates as to the cost have been gone into in Appendix 7.)



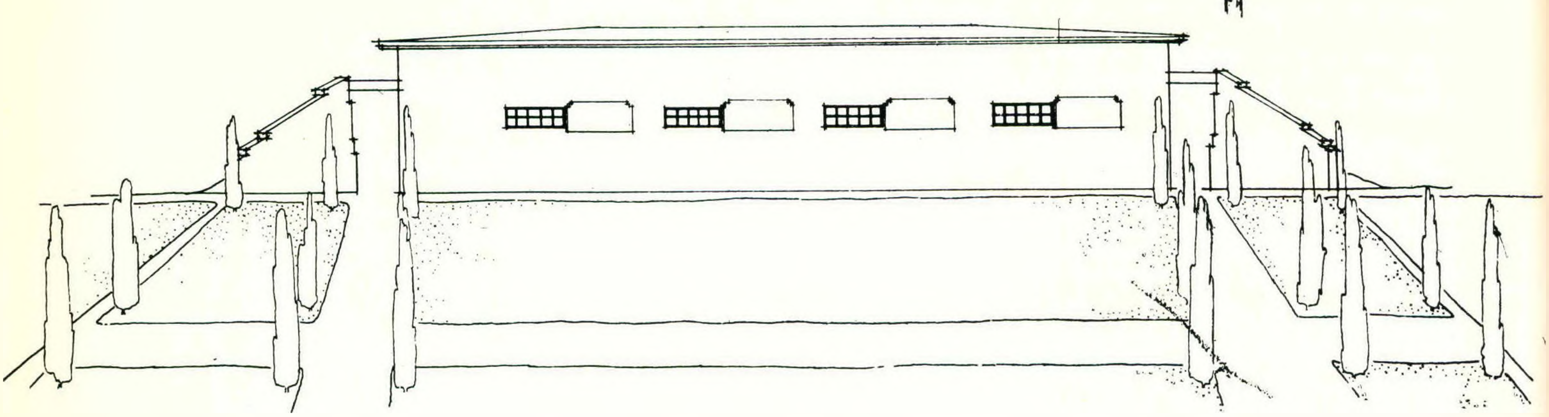
OUTLINE SYSTEM OF TRENCH GASPROOFING FOR COMMERCIAL & PRIVATE BUILDINGS — EMERGENCY USE ONLY — PERSPECTIVE SKETCH — NOT TO SCALE



SECTION THROUGH A—A



PLAN



ELEVATION OF SHELTER USED AS PEACETIME RESTROOM FOR STAFF

The accompanying illustration gives a suggested standard form of shelter which is a completely self-contained unit, the construction being as follows :

The actual shelter room itself is 30ft. x 40ft. x 11ft. in height, seating and resting accommodation for the occupants being provided. The walls are of 12in. concrete reinforced with ¾in. dia. bars at 9in. centres vertically, with ¼in. spacing bars at 18in. centres horizontally on both sides of the wall, the front and back reinforcement being held together with rectangular links of ¼in. dia. bars at 12in. centres. This construction has been tested successfully by the Air Raids Precautions Department to give complete protection against 500lb. explosive bombs falling not less than 50ft. away. The roof construction is as previously designed for domestic protection against light bombs of the incendiary type, with the necessary steel beams and stanchions to support the greater span. The floor and foundations are of normal reinforced concrete.

There are three entrances/exits to the shelter, one set being reserved for emergency only, one for normal access during gas attacks and one arranged so as to allow of hurried access without passing through the air lock and change rooms in the event of a bombing attack being unaccompanied by gas.

It will be noted that the majority of persons entering the unit even during a gas raid will have had at least five minutes' warning and will be able to enter before the "non-gas" entrance is closed. Only a small proportion of late-comers will need to use the air lock.

The air lock for normal access in case of gas bombing is composed of an air-tight and bomb-proof entrance door guarded by a wall and revetment against damage by explosions. It leads directly to two curtained sub-divisions for trapping gas admitted when the door is opened. From this sub-division access is gained to the changing rooms, where contaminated persons strip their clothes, placing them in the compartments provided, for later decontamination or destruction, and passing on to the cleansing rooms. If they are gassed or injured, they go, after cleansing, to the first-aid room. (If only explosive bombs are being used, the entrance is gained through the "non-gas" passage, and injured have immediate access to the first-aid rooms as they are uncontaminated. In cases of gas, the injured must not be admitted to first-aid treatment till they have been stripped, cleansed and decontaminated. It will be noted that the planning of the entrances has been arranged to automatically assure this.)

After cleansing the person with soap and water, fresh uncontaminated clothes are put on and the entrant has immediate access to the shelter-room proper.

It will be noted that once the air-tight doors over the "non-gas" entrances have been closed, no gas can directly enter the unit. Gas which is admitted into the first sub-division of the air lock after entering only partially contaminates the air. Gas cannot pass through the curtain trap which divides this compartment from the stripping-room, and only a small portion of dilute gas enters with the persons raising the curtain; this gas is proportionately diluted by the large volume of air in the stripping room, and becomes extremely weak. If any of this weak gas is admitted to the cleansing room by parties raising the curtain trap between stripping and cleansing-rooms, it is so dilute as to be ineffective. None will be admitted from there to either the first-aid room or the dressing room. Consequently no gas can enter the actual shelter room. Explosions outside cannot blow the curtains out of place as the air-tight doors at the entrances of the shelter are rendered bomb-proof as for the domestic dwellings (see drawings). For decontamination reasons (to be gone into later) it is essential that the whole of the air lock, changing room, contaminated clothes room, cleansing and dressing room be tiled throughout, ceiling, walls and floor. Gas curtains are, in addition, fitted to all door openings, without exception, as an added protective precaution. Earth closets, wash-hand basins and urinals are provided off the main shelter room, and the room itself is equipped with all the necessary requirements as outlined in Appendix 3.

This unit is designed to contain 250 occupants (without outside ventilation) for six hours, with an emergency maximum time limit of 12 hours. It is the largest advisable size, as although it provides adequate protection from incendiary bomb direct hits, gas, and distant explosive bomb hits, it cannot give protection against the direct hits of the larger calibre bombs and aerial torpedoes. It is therefore not desirable to have more than 250 persons collected in one place, where a direct hit would cause a considerable number of casualties. Should the staff be greater, the number of shelters must be increased to accommodate them all, either on the same or a similar scale of planning.

Owing to the clinging nature of many of the present war gases, and their heaviness, it is not desirable to sink these shelters below ground level, although greater protection against bomb splinters would thereby be gained. The shelter designed, therefore, has been placed nearly at ground level, with revetments protecting the entrances and exits. The drainage from the sanitary accommodation (urinals, water drainage to cleansing room, etc.) must be led directly downwards to a soak-away so as to prevent any danger of bomb craters near the building admitting gas through the drainage pipes.

Further advisable precautions are :

1. See that the ground in the vicinity of the shelter is kept well ploughed or turned.
2. Soil may be piled up against the side of the shelter, but kept well clear of the entrance.
3. Access to the shelter should be kept absolutely clear at all times, to allow of immediate entrance.

It is suggested that during peace-time the shelter could be used as a rest-house and recreation room for the staff. This idea has much to commend itself, as the occupants would become acquainted with the premises, and this would mediate against panic in time of attack, besides providing a useful peace-time purpose for the structure.

The foregoing completes the investigation of this section of the subject for the purposes of the thesis. The writer is only too aware that he has been unable to do more than touch on the fringe of an intensely difficult, complicated and urgent problem. It has proved hard to obtain accurate information on the subject, even with the whole-hearted co-operation of numerous people, owing to lack of knowledge on the matter. The actual constructional details are therefore entirely theoretical, but are based on the known results of experiments made by the Air Raids Precautions Department, Whitehall. The British Government is at the moment investigating this problem of integral constructional protection, and intends putting the results into a handbook of information for its defence officials, architects and others concerned.

The writer, however, chose the subject in spite of its difficulty because of its extremely practical nature, coupled with the fact that he felt nothing was being done in the matter in this country. With the information placed at his disposal, he has earnestly endeavoured to present a logical, practicable and efficient scheme for gas and bomb protection for innocent non-combatants. The men, women and children who are needing it so badly in Spain, Abyssinia and China to-day, may need it even more desperately in South Africa to-morrow.

APPENDIX No. 1.

In addition to the masks manufactured by the British Government, the following firms undertake their private production:—

Avon India Rubber Co.,
J. E. Baxter and Co.,
Greengate Irwin,
D. Moosley, Ltd.,
Siebe Gorman,
North British Rubber Co.,
India Rubber and Guttapercha Co.,
Leyland,
Lancashire Rubber Co.

None of these firms can guarantee their masks after a period of six months. They cannot guarantee them effective against any of the late gases produced by various foreign countries.

APPENDIX No. 2.

Gases, likely to be met with in war, against which the respirator offers no protection:—

1. Prussic Acid Gas.
2. Sulphuretted Hydrogen.
3. Carbon Monoxide—Respiratory poison.
4. Nitrous fumes—Respiratory irritant.
5. Arseniuretted Hydrogen.
6. Trinitrotoluene.
7. Phospherous Oxides.
8. Vincintite.
9. Dichlorodiethyl Sulphide.
10. Chlorovinylchloroarsine.

APPENDIX No. 3.

Considering whether the suggestion for incendiary bomb-proofing falls within the bounds of practical possibility for the average building, the cost per super yard of the construction would approximate :

6″ slab, 1 super yard @ 7/-
3″ „ „ „ „ @ 4/-
3″ „ „ „ „ @ 4/-
12″ of earth, one super yard at 2/-
8″ granulated asbestos, 1 super yard at 7/-
Steel reinforcement to 6″ slab, say 6/- per super yard
„ „ „ 3″ slabs, say 2/- per super yard each
Tight casing to the above, 1 super yard at 6/-
Plastering to ceiling, 1 sq. yard at 2/6

.................A total of £1 17s. 6d. per super yard.

That is to say, to adequately protect an 18ft. x 18ft. room against incendiary bomb direct hits, would entail an additional outlay of approximately £68.

To protect an entire house of average size, say 60ft. x 60ft. (outside dimensions), would cost approximately £750, less the cost of the normal roof and ceiling it would replace—say £750 less £400, that is an additional outlay of £350.

This sum, so far, at any rate, is only too plainly within the bounds of the average householder's purse, considering the serious nature of the danger, and the protection afforded.

APPENDIX No. 4.

GASES POSSIBLY TO BE MET WITH UNDER LOCAL CONDITIONS.

COAL GAS-PRODUCTS :

Trinitrotoleune: From which is derived Brombenzyl Cyanide.
Nitrobenzen: From which is derived Dipenylchlorarsine.

SALT GAS-PRODUCTS :

Phosgene: From the basic derivation of which, in conjunction with Chloracetic acid, the gas Chloroaceot-phenone is formed.

CYANOGEN CHLORIDE :

OTHER GASES :

Prussic Acid Gas.
Sulphuretted Hydrogen.
Carbon Monoxide—Respiratory poison.
Nitrous fumes—Respiratory irritant.
Arseniuretted Hydrogen.
Trinitrotoluene.
Phosphorus Oxides.
Vincintite.
Dichlorodiethyl Sulphide.
Chlorovinylchloroarsine.
Chlorine.
Chloro picrin.
Phosgene.
Lewisite.

APPENDIX No. 5.

EQUIPMENT REQUIRED FOR AIR RAID UNITS.

1. A list of those who ought to use the shelter, so that a roll call can be made.
2. Tables and chairs of benches.
3. Blankets, or other warm coverings.
4. Plates, cups, knives, forks, etc.
5. Means of occupying the time without exertion (books, playing cards, etc.).
6. Emergency lightning arrangements (emergency lighting or candles and matches or electric torches or hurricane lamps and matches).
7. Basins for washing and soap and towels (in lavatory).
8. First-aid outfit.
9. Emergency means of rendering air lock gas-proof again, if gas-proofing should be destroyed.

FIRST-AID :

1 triangular bandage, unbleached calico, B.P.C., 38in. x 54in., wrapped.
1 white open wove bandage, B.P.C., 1in. x 3 yds., wrapped.
1 white open wove bandage, B.P.C., 2in. x 4 yds., wrapped.
1 ½oz. plain lint, B.P.C., wrapped and cartoned.
1 ½oz. absorbent cotton wool, B.P.C., interleaved, wrapped and cartoned.
1 pair surgical scissors, 5in.
6 safety pins, nickel plated on brass, in metal container, size 3.
3 30 minim ampoules, 2 per cent. alcholic solution of iodine, in card containers.
1 2oz. stoppered bottle of sal volatile, in metal case.
1 2oz. graduated medicine tumbler, in strong container.
1 piece strong cane, 6in. long.

Elastic plaster dressings, assorted sizes, for minor injuries.

APPENDIX No. 6.

CONSTRUCTION OF TRENCHES.

Trenches should be 7ft. deep and passage-ways should be 2ft. wide. The parts of a covered trench used as shelters should be wider than 2ft.—the exact width depending on the form of shelter to be provided.

The trench should be revetted. One method is to use wooden frames with boarding, corrugated iron or any other suitable material behind. Where boarding is used, the following notes apply to the passage-ways:—The excavated width of passage-ways should be 2ft. 10ins. and revetting should be done with inch boarding with 4in. by 2in. uprights. The uprights should be driven 1ft. 6ins. into the ground, and held apart at the head by 4in. by 2in. spreaders. This gives a clear width of 2ft.

The trench should be rendered as weather-proof and gas-proof as possible; this could be done by covering with 2ft. of earth. If rubble is available, a layer of 9ins. or 12ins. of rubbish should be placed on top of the earth. The earth should be supported on corrugated iron, resting on 6ins. by 3in. rafters at 1ft. 6in. intervals, fitted on 6in. by 12in. wall plates.

Trench system should have at least two entrances. An air lock should be provided in the passage-way at each entrance. This may take the form of two gas curtains, with a shelf at the side of the trench on which the curtain is placed when not in use. The gas curtains should be at least 4ft. apart, and preferably anything up to 10ft. apart in a communal shelter.

Covered trenches may be provided either with seats in recesses cut off the passage trench or with bunks in chambers cut off the passage trench.

(a) Seats in recesses for ten persons.

A recess 15ft. long and 1ft. 6ins. wide will accommodate 10 persons. The seat should be 1ft. 3ins. wide. The recesses should be dug on each side of the passage trench alternately.

(b) Bunks in chamber for six persons.

The inside measurements of the chamber should be 6ft. 6ins. by 4ft. 6ins. by 6ft. 9ins. deep. It should be revetted by 1 1½in. boarding or other suitable material held in position by the uprights of the bunking. Bunking for six persons made of 3in. by 3in. timber, 3in. by 1in. wood fillets and expanded metal sheets, giving each bunk 6ft. 6ins. length and 2ft. clear width.

CONSTRUCTION OF GALLERIES.

Provided there is sufficient earth overhead, galleries afford very good protection for personnel during air raids. Galleries with chambers off them are recommended instead of the continuous tunnel type. The continuous tunnel does not provide for any localisation of burst, and this is essential if the protection is only splinter-proof. The localisation of burst is best arranged by a travel gallery with chambers off, the travel gallery being a passage, along which people travel to reach the chambers. The size of the gallery need not be large (if it is, people will tend to stay in it instead of the chambers), but it should have plenty of entrances.

For the travel gallery, a width of 2ft. 9ins. and height of 6ft. 4ins. should be enough. The chamber should be 8ft. wide (including the width of the gallery) and 13ft. 6ins. long. Entrances to the system should be about about every 100ft. or to suit exits from the buildings. The entrances should be 5ft. wide.

The frames, or setts as they are called, for lining galleries, may be made of various materials. Wood setts have been largely used, but a steel frame is recommended. It is simple, inexpensive and very effective. One of the advantages of these steel frames for galleries is the simplicity of erection. Steel frames are made in two parts, each part consisting of vertical sides with the tops sloping upwards to the centre of the arch; the two parts can be locked together along the top of the arch. If lock sheeting is used, it should be 6ft. 6ins. by 3ft. for galleries and 8ft. 10ins. by 9ft. for chambers. The width of the sheets is 1ft. 6ins. They are fixed at the top of the arch by a steel clip and wedge.

In undertakings where large slag heaps or waste dumps are formed, as at coal mines, tin mines, etc., shelter galleries can easily be formed by erecting these steel frames at ground level on the site of a proposed slag head or dumping ground for waste, and in time they will be covered by a considerable thickness of slag, etc.

If tunelling is resorted to and lock sheets are used, the excavation has to be well on in front before the sheet can be positioned owing to the arching of the sheets; therefore the earth must stand up well. The hole excavated to take the sheets must be about 1ft. larger than the size of the sheeting and, after fixing the sheets, must be packed behind. If this is not done, great difficulty will be experienced in fitting, and there will be gaps above the sheeting between projections.

APPENDIX No. 7.

CONSIDERING VERY BRIEFLY THE APPROXIMATE COST OF A COMMERCIAL SHELTER AS ILLUSTRATED.

CONCRETE :

4:2:1 cement concrete on tight casing packed round reinforcement :

12″ walling	3,710 sq. ft.
6″ walling	1,480 sq. ft.
6″ concrete floor	2,080 sq. ft.
6″ roof slab	2,080 sq. ft.
3″ roof slab	1,040 sq. ft.
Foundations	2,000 sq. ft.
	12,390 sq. ft., i.e., 4.130 cu. ft.

	£	s.	d.
460 cubic yds. @ 40/-	£920	0	0
Reinforcement, including R.S.J.'s Item	1,000	0	0
Tiling to all internal walls: 188 sq. yds. @ 23/-	404	4	0
Silicate of soda application to all external concrete surfaces : 222 sup. yds. @ 2/6 per yd.	27	15	0
5 bomb- and gas-proof doors @ £12	60	0	0
22 gas-proof curtain traps @ £1	22	0	0
Builders' sand for roof. Item	10	0	0
8″ granulated asbestos: 70 sq. yds. @ £2 5s. 0d. per sq. yd.	157	10	0
First-aid equipment. Item	250	0	0
8 windows with gas and bomb-proof covers: 8 @ £5	40	0	0
Equipment of rooms and E.C.'s	250	0	0
	£3,141	9	0
10 per cent. for unconsidered extras	321	6	8
Say an approximate total	£3,500	0	0

As the shelter accommodates in perfect safety 250 persons, the average cost per occupant would be about £15 0s. 0d.

APPENDIX No. 8.

GLOSSARY OF TECHNICAL TERMS.

Air Lock : A compartment or lobby at the entrance to a gas protected room or shelter which enables persons to pass in and out without admitting gas.

Bleaching Powder : Chloride of lime.

Concentration : The proportion of gas in a given volume of air.

Contamination : The liquid or vapour remaining on an object or person as a result of exposure to gas (usually a persistent gas).

Decontamination : A process intended to remove the contaminating gas or to render it harmless.

Gas : Includes any chemical substance, solid, liquid or gas, used in war for its poisonous or irritant effects on the human body.

Non-persistent gas : A gas which forms a cloud (not necessarily visible) immediately it is released and leaves no liquid contamination on the ground.

Persistent gas : A gas in liquid form which evaporates slowly and so continues to give off dangerous vapour for a long period.

Respirator : An apparatus designed to protect the eyes and lungs from gas.

THIS THESIS WILL BE CONCLUDED IN THE FOLLOWING ISSUE.

Minutes of the Eleventh Annual General Meeting of Members held in the Institute's Room, No. 5, Poynton's Chambers, Smith Street, Durban, at 4 p.m., Friday, 11th March, 1938.

PRESENT.

Messrs. B. V. Bartholomew (President), D. C. McDonald (Vice-President), E. M. Powers, W. S. Payne, L. A. Peyton, A. G. Frolich, Col. G. T. Hurst, R. G. Stead, F. W. Powers, E. S. Powers, Wallace Paton, C. S. M. Taylor, R. C. Bennett, G. E. Le Sueur, R. P. Hamlin, W. Hirst, I. Park-Ross, J. C. Simpson, W. J. Gunn and T. H. Chaplin, Secretary. The President, Mr. B. V. Bartholomew, occupied the chair.

Apologies for absence were received from Mr. H. E. Chick and Mr. M. Poole.

NOTICE CONVENING MEETING.

The notice convening the meeting was taken as read, and the Chairman declared the Eleventh Annual General Meeting duly constituted.

MINUTES.

The minutes of the Tenth Annual General Meeting held on 12th March, 1937, having been circulated to all members, were, on the motion of the Chairman, taken as read, confirmed, and signed by the Chairman.

The Chairman, in welcoming the members, and particularly the new members, whom he wished every success in their future career, expressed his pleasure at seeing so fine an attendance, and in a brief address said that beyond the matters dealt with in the Committee's annual report, there was little to add. He urged members to be loyal to one another by adhering to the scale of fees as laid down in the Act. He was afraid there was a decided tendency on the part of some to ignore the tariff by devious ways suspected by the Committee, to the detriment of other practitioners who were more honourable.

The Committee had discussed this matter and reported upon definite cases of subversion which are known, and it is seeking evidence in order to effectively deal with the situation and members of this Institute. Concrete evidence in this direction is welcomed by the Committee.

Instances have been reported where financial agents and prospective clients have subverted or endeavoured to subvert members of this Institute from adhering to the tariff, with the result that those architects were being controlled by financial agents. A tendency towards and a land slide in this direction would be a catastrophe, and he appealed to members to be loyal and maintain the tariff at all costs.

The Chairman, in thanking the members for the honour of being their President for the past year, expressed his thanks to his colleagues on the Committee for their great assistance and loyal support during his term of office, and also thanked the Secretary, on behalf of the Committee, for the efficient manner in which he had carried out his duties.

ANNUAL REPORT AND BALANCE SHEET.

The annual report and balance sheet, a copy of which had been circulated to members, were, on the motion of the Chairman, taken as read and laid on the table for discussion.

In moving the adoption of the annual report and balance sheet, the Chairman said that the members would appreciate this Institute's sound financial position.

The motion, being seconded, was carried unanimously.

APPOINTMENT OF AUDITOR.

Mr. J. E. Duff, F.S.A.A., was re-appointed auditor for the ensuing year.

NATAL ARCHITECTURE MEDAL.

The Chairman advised the meeting that, in compliance with the Conditions of Competition for the Natal Architecture Medal for the year 1937, the Jury, after careful examination of all the buildings which were nominated for the honour, have given their award in favour of Grosvenor Court Flats, Marine Parade, Durban, the architects responsible for the successful design being Messrs. Kallenbach, Kennedy & Furner, A.R.I.B.A., Johannesburg and Durban. The Chairman much regretted that, as no representative of the successful architects was present, the presentation of the medal could not be made at the present meeting. It was accordingly proposed, seconded and unanimously resolved that the medal be awarded to the firm's head office, Johannesburg.

ELECTION OF NEW COMMITTEE.

The Chairman declared the ballot for the new Committee closed, and the ballot papers having been dealt with in accordance with the regulations, the scrutineers appointed by the meeting retired to count the votes.

The result of the ballot was handed to the Chairman, who thereupon announced the following nine members duly elected on the new Committee for the ensuing year:—

Messrs. B. V. Bartholomew, Wallace Paton, E. M. Powers, Col. G. T. Hurst, D. C. McDonald, C. S. M. Taylor, W. S. Payne, W. Hirst (Practising) and Mr. Melville Poole (Salaried).

UNDER GENERAL.

Natal Architecture Medal—1938.

Mr. D. C. McDonald suggested that the conditions governing the adjudication of buildings for the Architecture Medal award be revised, as he thought that the present system of adjudication could be improved upon.

After some discussion, it was resolved that this item be left to the incoming Committee to consider and thereafter could be discussed by members at a quarterly meeting.

Work by Unqualified Persons.

A general discussion ensued regarding architectural work being carried out by unqualified persons.

Mr. Ernest M. Powers (President-in-Chief) explained that the Committee had given a great deal of attention to this matter, and had considered in conference with the City Council the question of a new by-law to the effect "that all building plans for work of a value exceeding £750 shall be prepared and signed by a registered architect," but the by-law, on being submitted to the Provincial Council, had been turned down.

Mr. Hamlin suggested that some sort of propaganda be instituted so as to bring the profession and the duties of the architect before the general public. It was eventually agreed that this matter be placed on the agenda for discussion by members at a quarterly meeting.

ARCHITECTURE CLASSES.

At the instance of Mr. F. W. Powers, it was agreed that a circular letter be addressed to those firms employing students, to allow the students off-time during office hours to attend the lectures given at the Natal University College, Durban.

MEETING CLOSED.

On the Chairman declaring the business of the meeting completed, a hearty vote of thanks was accorded him for his successful term of office.

The meeting terminated at 5.50 p.m.

COMMITTEE, 1938-1939.

Messrs. B. V. Bartholomew, A.R.I.B.A., President; D. C. McDonald A.R.I.B.A., Vice-President; Wallace Paton, F.R.I.B.A.; Ernest M. Powers F.R.I.B.A.; Col. G. T. Hurst, F.R.I.B.A.; W. S. Payne, A.R.I.B.A.; C. S. M. Taylor, A.R.I.B.A.; W. Hirst, A.R.I.B.A.; Melville Poole, A.R.I.B.A. (Salaried).

REPRESENTATIVE ON CENTRAL COUNCIL.

Mr. B. V. Bartholomew, A.R.I.B.A.

Alternate.

Mr. D. C. McDonald, A.R.I.B.A.

PROFESSIONAL NOTES AND NEWS

The following notice is published for the information of members:—

BUILDERS' TEMPORARY CLOSETS.

Notice is hereby given that temporary builders' closets for use in connection with all building operations, within a sewered area, commenced after the 31st May, 1938, must be connected to the sewer.

Any further information may be obtained from Room 95, Municipal Offices, City Hall.

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Mr. B. S. Cooke, Dipl. Arch. (Rand) has removed his offices to 907, Winchester House, Loveday Street, Telephone 33-8828.

OBITUARY

ANDREW ALLEN

We regret to record the death of Mr. Andrew Allen, who for many years was closely associated with the town planning movement in the Transvaal.

Mr. Allen was born at Ballymena, Ireland, in 1868, and came to South Africa some forty years ago. He opened a business known as Allen's Asphalt Company in Capetown, and was one of the first to consider the possibility of opening tin mines at Kuils River. About ten years ago he moved to Johannesburg, where the founded the Asphalt Manufacturing Company, of which he was the proprietor. He took an active interest in all plans for the improvement of Capetown, and was one of the first to recommend a foreshore improvement scheme when the subject arose about ten years ago. This scheme created considerable interest and was published some years ago in this journal.

He was President of the Transvaal Town Planning Association and prepared schemes for the improvement of the railway area in Johannesburg and the beach at Durban. During his residence in Capetown he was President of the Irish Association and later became President of the same Association in Johannesburg. He was also a well-known Rotarian.