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South African Architectural Record: Journal of the Cape, Natal, Orange Free State and Transvaal Provincial Institutes of South African Architects and the Chapter of South African Quantity Surveyors

1953
South African Architectural Institute
http://hdl.handle.net/10539/22933
South African Architectural Record; Journal of the Cape, Natal, Orange Free State and Transvaal Provincial Institutes of South African Architects and the Chapter of South African Quantity Surveyors. 1951 36:1-12 p1-281

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SOUTH AFRICAN ARCHITECTURAL RECORD

JOURNAL OF THE INSTITUTE OF SOUTH AFRICAN ARCHITECTS: THE CAPE, NATAL, ORANGE FREE STATE AND TRANSVAAL PROVINCIAL INSTITUTES AND THE CHAPTER OF SOUTH AFRICAN QUANTITY SURVEYORS

A LAWRENCE H. TEARLE PUBLICATION

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VOLUME 38
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Annual Subscription £1 10s. direct to the Publishers.

EDITORIAL OFFICES: 612 KELVIN HOUSE, 75 MARSHALL STREET, JOHANNESBURG. TELEPHONE 34-2921.
PUBLISHED FOR THE INSTITUTE BY LAWRENCE H. TEARLE & CO., 39 ROELAND STREET, CAPE TOWN. P.O. BOX 4562. TELEPHONE 3-2682.
JOHANNESBURG REPRESENTATIVE: THE LINK PUBLISHING CO. (PTY.) LTD., 216 VOLKSKAS BUILDING, MARKET STREET, JOHANNESBURG. P.O. BOX 160. PHONE 33-1605.



JOHANNESBURG REPERTORY THEATRE

ARCHITECT MANFRED HERMER

Above : Facade showing use of multi-coloured bricks ; rehearsal room piers painted alternately white and blue, and brackets carrying the marque in sugar-cane. Right : View towards stage. The walls are lined with untreated ash panelling, the soundboard over the proscenium-opening and the trap doors which cover the front-of-house lighting slots are similarly finished. The ceiling is dark red, and the air-conditioning outlets, the proscenium frame and the light fittings are bronze. Front-of-house lighting is contained in the wall projection.



ON the 13th June, 1945, the Johannesburg Repertory Players instructed the architect to prepare sketch plans for a building on two stands in Braamfontein, with the following programme:

Theatre with balcony, vestibule, three Committee rooms, rehearsal room, library, dressing rooms, store room, work room, dining room, kitchen, bar, cloakrooms, shop and booking office.

No further indication was given as to seating accommodation, sizes or numbers of dressing rooms, etc., and it was left to the architect to work out a practical scheme or the whole project.

On the basis of an estimate which was received at that time it appeared that the building would cost in the neighbourhood of £100,000 and a scheme was thereupon launched by the Johannesburg Repertory Players for raising this amount of money.

As time went on, however, it was found that the building costing £100,000 excluding ground, furniture and equipment would be too big a proposition for the Society to carry by itself and steps were taken to reduce the cost of the project.

Over a period of time various schemes were submitted, the design being continually changed, and eventually on

the 19th August, 1949, the final programme was issued to the architect by the Society in the following form:

Seating capacity: Approximately 500.

Stage: It was agreed that a sliding stage and stage lift be omitted, and that a very simple revolving stage be provided.

Rehearsal room:

Dressing rooms: Six dressing rooms to accommodate up to three persons each and two dressing rooms to accommodate up to 15 persons each.

Offices: Three offices, one of which must accommodate up to fifteen people as a board room.

Miscellaneous: A dock for scenery used during current productions; a scenery storeroom in which there should be provision for installing light machinery, and this should be heated; a property storeroom; a carpenter's and electrician's shop combined; a small office for the stage manager on stage level; a porter's cubicle at the stage door entrance; a wardrobe store in which should be installed a small laundry tub with hot and cold water and provision for ironing; a janitor's store; all the necessary cloakrooms, including a shower room for artists.

Native quarters: One small single room and one room for three or four persons.

Musicians' room: For storing musicians' instruments.

Orchestra pit: To accommodate approximately 30.

Cyclorama:

Refreshment room:

Even after this programme was issued various other target figures were given to the architect, and eventually a scheme was settled on to cost approximately £70,000.

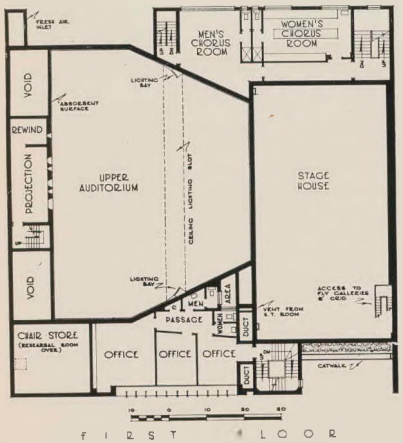
After a tender at £70,827 had been accepted it was found necessary to still further reduce this cost, and this was done in the form of a reduction estimate based on the schedule of rates existing in the Bill of Quantities, and was done with the idea of reducing the cost of the building to approximately £56,000. In order to do so every item had to be reduced to the minimum, with the result that the reduction estimate included the omission of such small items as a walkway at £75, a couch in the snackbar at £50 and of good finishings for even small amounts which, in relation to the total cost of the project, would appear out of all proportion. The reduction of costs had become so vital that without these cuts the theatre could not have been built.

It will be seen therefore that this was not a case in which various sketch designs were prepared and the best accepted. The project was designed and re-designed to different prices over a period of three or four years, and the difficulties of the site and of the bye-laws were only too familiar by the time the final scheme came to be drawn up.

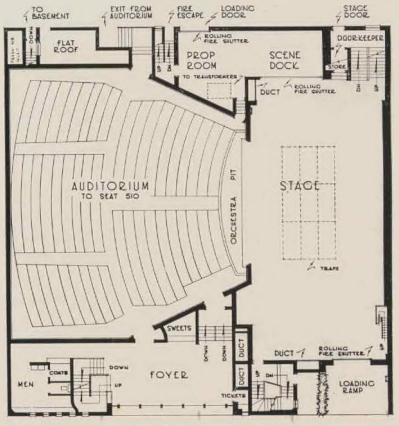
Planning

The chief problem in planning arose out of the bye-law which prohibits the erection of buildings over or under the stage or auditorium other than buildings necessary in connection with the stage.

The site is 100 feet square and it was decided at the outset that a minimum depth of 35 feet for the stage was necessary, the balance of the 100 feet being therefore available for auditorium space. From the beginning the



FIRST FLOOR



GROUND FLOOR

idea of access from the foyer on the long axis of the theatre was therefore excluded, and a side access was accepted.

Furthermore, the fact that the air-conditioning consultants required a considerable void underneath the floor of the auditorium to act as a plenum space connected with the air-conditioning system precluded the use of a system well-known in Johannesburg, whereby the rear portion of the auditorium is stepped well up and the foyer is introduced underneath, access being given to the auditorium by means of vomitories.

The dimensions along the long axis having been obtained and the idea of side entrances to the auditorium having been accepted, it remained to decide whether the long axis of the auditorium should run east west or north-south. The following diagram will illustrate how the choice was made:



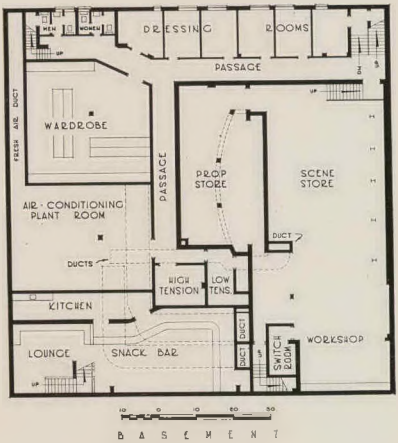
The areas marked A and B (the only areas which were not under or over the stage or auditorium) had to be used for the essential services not connected with the stage, such as foyer, offices, snackbar, dressing rooms, etc. The fact that these areas had to face on to the street and sanitary lane, immediately dictated the axis of the auditorium. The widths of A and B were determined by the width of the auditorium, which in turn had to be designed to accommodate the required 500 patrons. It will be seen therefore that the width of portion A was restricted by the width of portion B, the latter being determined by the minimum depth required for the dressing rooms. Area A worked out small, but in view of the fact that there was no desire on the part of the Society to prejudice either the auditorium or the stage it was accepted that the foyer should rather be small.

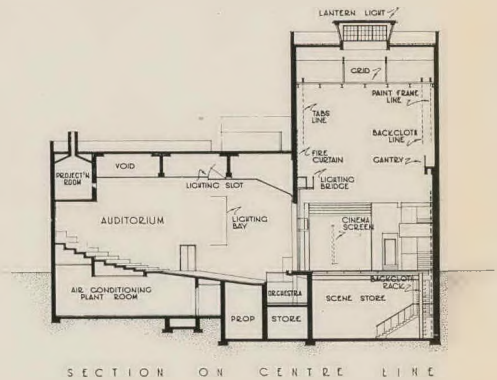
When the portions marked A and B were established for general accommodation it remained merely a matter of fitting these in as well as possible.

One undeniable advantage of the multi-storey system that exists on the two sides of the auditorium is that there is no crossing of the principals and chorus in reaching the stage. Another is that the offices and rehearsal room are sufficiently cut off to allow complete privacy for these apartments whilst permitting easy access to the main theatre.

The Stage

The ideal depth of the stage would have been one-and-a-half times the width of the proscenium opening, which





is 33 feet. In view of the fact that the depth had to be restricted to 35 feet, it was decided to make up in the length, and it has been found in practice that the enormous wing space available more than offsets the disadvantage of the 35-foot depth.

The stage was originally designed to take sliding wagons, but these had to be omitted on account of cost and unfortunately the counterweight system from the flies could not be relatively increased for the same reason of cost. It is now being found that the number of counterweighted and handline sets supplied within the original project is inadequate and steps are being taken to increase it.

The whole grid system is prepared for a full complement of lines. The height of the grid has been dropped by ten feet from the original height for which it was designed, and is now at what may be considered a minimum height in relation to the proscenium height of 18 feet.

At first glance the stage gives the impression to some observers that it is too complicated and professional for a society such as the Johannesburg Repertory Players, but practice has shown that not only this Society but other amateur and professional societies who use the stage could do with considerably more stage apparatus than has in fact been provided, and that the area of the stage is not in any way excessive.

The orchestra pit which accommodates 35 musicians has been tucked away almost completely under the stage in order to avoid any waste of space in the auditorium. The lighting control board is located on a gallery approximately nine feet above the stage for easy control of the lighting.

Some discussion took place on the provision of footlights which, in many contemporary theatres, have now been abandoned. It was decided, however, to include them, and they are removable for use as cyclorama ground-rows or otherwise, and the footlight trough can be boarded over. Floor dips are distributed around the acting area, consisting of small trapdoors in the floor with plugs beneath to which any electrical apparatus can be connected. There is also a vertical row of similar plugs on each side of the proscenium opening.

In the stage house above the proscenium opening runs a lighting bridge from which lights can be shone down into the acting area, and this bridge gives access to the roof space carrying the front-of-house lights in the auditorium ceiling. Lighting battens hung from the grid as required are connected to outlets on the rope lock fly gallery.

All these lights, the auditorium house lights and the vertical lighting slot outlets in the auditorium can be connected at will to the dimmer board. This very up-to-date Swedish equipment employs what may be described as variable transformers in lieu of bulky resistances or expendible electronic valves. The controls are very small, with a movement of an inch or two only, and various settings may be pre-set at rehearsal and brought in immediately when required at the touch of a button. The electricians' gallery containing the control boards is situated immediately above the stage manager. A battery standby system is available for emergency safety lighting in case of power failure.

At the stage manager's station are installed gramophone turntables for sound effects, controls for the curtains, and signal lights or telephones to house manager, orchestra pit, fly galleries, projection booth and dressing rooms.

Auditorium

The area of the auditorium having been determined as previously described, the volume was worked out in relation to the number of seats provided, in order to give specific acoustic properties.

From the outset a reverberation time of one-and-a-half seconds was decided upon, and it was further decided that the walls be panelled so that the acoustic properties would be a built-in characteristic of the theatre.

It was for the same reason that acoustic tiles were used on the back walls and that the ceiling was done in fibrous plaster after a portion of the panelled ceiling had been omitted on account of the cost.

The panelling is $\frac{3}{8}$-inch laminated board, and the brandering behind each panel is slightly different to that of its neighbour in order to prevent any harmonics occurring between adjoining panels.

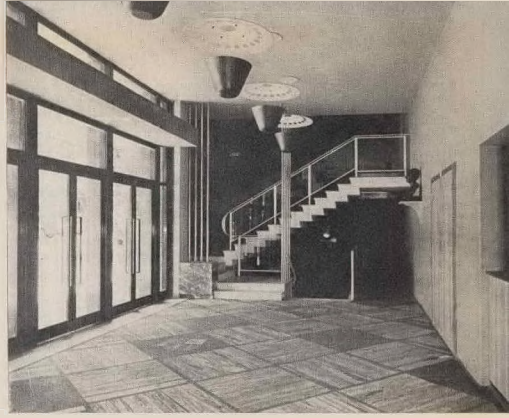
A soundboard is provided over the proscenium, and models and diagrams were made to ensure that specific acoustic properties would exist.

It had been argued that an auditorium as small as this one would provide no acoustical problem, but it was found that it was only too easy to create too high a reverberation level in this small auditorium. This, in its ultimate effect, would have been as bad as an auditorium which, due to bad design, had dead spots in certain spaces. For this reason the closest attention was paid to the shape of the auditorium in plan and section, and the steep rise of both the front and rear auditorium floors was as much due to a desire to enable patrons to receive the sound direct as it was to the necessity of providing good sight lines.

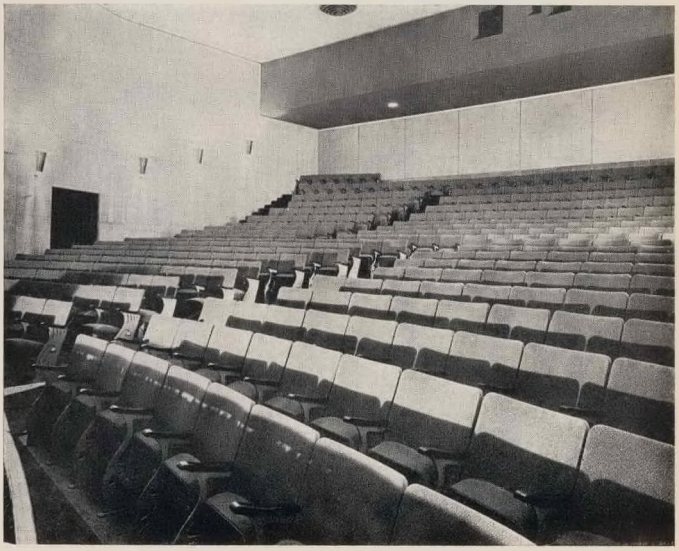
The carpetted aisles and upholstered seats were chosen so that it was immaterial acoustically whether a seat was occupied or not.

A problem in the design of the auditorium arose out of the requirements of front-of-house lighting. The lighting of the fore-stage always presents some difficulty, and the acting area also demands a certain amount of front-of-house lighting. If the light comes parallel with the stage

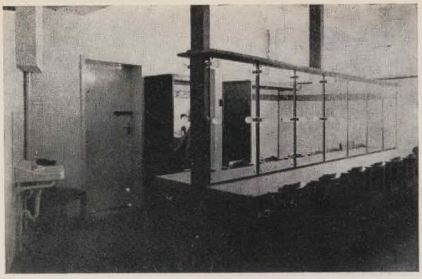


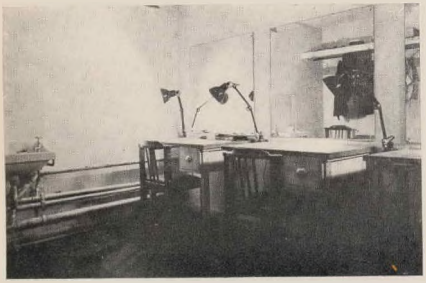


1. **View of foyer looking towards auditorium entrance doors.** The light fittings are specially designed and are finished in bronze. The rail poles are finished in satin chrome. The floor, of chocolate and white rubber, bears the crest of the Society. 2. **Foyer looking towards cloakrooms.** The end wall is finished in dark terra-cotta Tyrolean plaster, the balustrading is of double sheets of plate glass and the steps are finished in hardwood. 3. **View of auditorium from a corner of the proscenium opening.** The rear wall is finished in acoustic tiles, and the operating projection box in a dark red limpet absestos spray. The symmetrical splashes of light from the specially designed fittings are, apart from the graining of the panelling, the only decorations in the room.



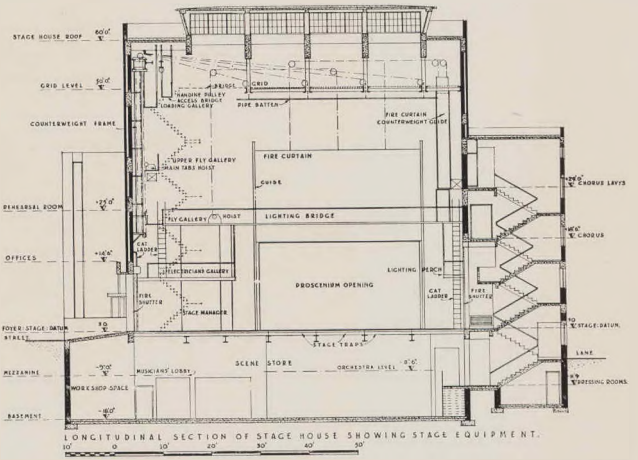
floor the tendency is for a shadow to be cast behind the actors on to the scenery, which in many cases destroys the perspective effect required. The front-of-house lighting is therefore placed to give as vertical a beam as possible, but this in turn tends to create ugly shadows on the faces of the actors. To offset this, lighting is required almost parallel with the stage floor, but not sufficiently strong to create the shadows referred to above. The distance of the projection box at the back of the auditorium from the stage precludes the use of this apartment for the purpose of the horizontal lighting, and slots were created in the auditorium walls.





1. View of men's chorus room. 2. A typical dressing room (unfurnished in the photograph) showing the independent tables and lighting system for the artists.

Photography by Willox.



LONGITUDINAL SECTION OF STAGE HOUSE SHOWING STAGE EQUIPMENT.

The design of these slots is such that the spotlights in them are not directly visible by any patron looking at the stage. The slots form a feature in the auditorium and added a further complication in that the excessive heat generated by the spotlights had to be taken off in the form of ventilators direct to the open air.

Some considerable discussion with the City Council took place in regard to the level of lighting required during performances. The Council insists that every patron should be able to see the patron furthest away from him in the auditorium, in order to avoid a sense of enclosure. It was only after the normal great spill of light from the stage into the auditorium during the running of a performance was demonstrated that the lighting provided in the ceilings as safety lighting was permitted to pass.

Ancillary Apartments

Considerable areas had to be devoted to workshops, property rooms, stores and wardrobes.

Whereas ideal theatre planning demands that the workshop be on the same level as the stage, the small size of the site prevented this being carried out in this case, and these apartments had to be located in the basement. An arrangement of traps in the stage floor was therefore provided so that heavy articles having to be raised to the stage could be lifted up by means of the counterweight system through the open traps. It has been found in practice that the location of these stores in the basement is no great disadvantage.

The dressing rooms located above and below the level of the stage have proved adequate in that the actors whilst off the stage can relax in their dressing rooms without being disturbed by the actions on the stage. A microphone hung in the flies is connected to loudspeakers in all the dressing rooms so that actors may, if they so desire, listen in to the progress of the play whilst in their dressing rooms and therefore gauge for themselves the amount of time available to them before their calls. A call system from the stage manager operates to all the dressing rooms by means of a system of lights, as bells or buzzers would constitute a disturbance on the stage.

The air-conditioning room in the basement was sound-insulated as far as possible by means of double ceilings and by placing all machinery on heavy layers of cork. Supply and exhaust ducting is largely of brick or concrete, to obviate drumming noise and vibration.

A separate exhaust system was introduced into the kitchen of the snackbar in order to prevent food smells from penetrating the auditorium.

Construction

The building is in general constructed in accordance with orthodox Johannesburg re-inforced concrete practice, but the form of the building raised some special problems. The auditorium roof was carried on three post-stressed re-inforced concrete beams six feet deep with six-inch webs and 15-inch flanges, spanning over 70 feet. Vibrators were used in pouring these narrow web beams. Precast post-stressed purlins were fitted between the main beams, and a re-inforced concrete slab cast to a fall over the area.

The back columns of the stage house have no east-west lateral support for a height of 80 feet from basement to roof over stage house, and are stiffened halfway up by a horizontal concrete gantry running across them. While the stage house roof concrete was being poured the weight was taken down to the main roof level by specially designed wooden trusses built up in the stage house.

The re-inforced concrete marquee slab penetrates through the shopfitters' screen to the front of the foyer. It is actually supported on kejaat-boxed R.S.J.'s, and is hung externally from projecting concrete blocks by mild steel hangers.

The Completed Job

The theatre has now been in use for some months. Sight lines have proved very satisfactory, and no acoustic complaints have been received from any part of the house for speech or music. It is not necessary for an actor on the stage to raise his voice to be heard anywhere in the auditorium.

The foyer has proved small and for the first few weeks was very crowded at the intervals. Now that audiences are familiar with the theatre they disperse to the snackbar and to the marquee outside, and conditions are quite reasonable.

The presence of an adequate rehearsal room on the site is a most satisfactory feature, and much use is made of this facility. The loading doors at each end of the stage have greatly eased the problem of the hurried removal of one set of scenery and properties while another company is moving in. The very full use being made of all the lighting points and stage machinery has amply demonstrated that a contemporary repertory theatre must be designed to cope with the ideas not of any one adviser, but with the different stage requirements of a great variety of producers and many different types of production.



EL PATIO MUIZENBURG CAPE PROVINCE

ARCHITECT E. GREENBLO



SECTION AA

This interesting minimum house designed to accommodate the architect, his wife and two small children, is sited on an extremely small level site, being only 46 feet wide, with a depth of 90 feet; its only advantage being that its narrow street frontage was on the south enabling the architect to design the main living space around a patio. A farther problem, to reduce the effect of constriction imposed by the narrow site, was to explore methods of increasing and organizing interior and exterior space. The designer was able to absorb the full effect of this by carefully integrating the lounge with the patio, and by arranging large windows over the passage fitting to give the effect of added visual space in a reasonably narrow passage.

The extreme compactness of the two minor bedrooms and the kitchen was mainly determined by the unusually restricted site. Bunks are incorporated in one of these bedrooms to increase the capacity without detracting from essential floor space. The aspect of these two minor bedrooms facing the narrow western corridor area was forced on the designer due to the fact that the invert level was only one-and-a-half feet deep, which necessitated placing the kitchen, bathroom and toilet as close as possible to the street.

Originally the house was designed with the dining space forming part of the lounge, and at a later stage it was decided to build a separate dining room. This was placed on the south of the main entrance, and while this position has the effect of retaining the maximum garden area, at the same time service from the kitchen to this room is rather extenuated.

The dining room and lounge are most comfortably furnished and extremely well detailed, with hardwood fittings and panelling well in evidence. The monopitch ceiling to the lounge is extremely effective and the exposed rafters add pattern and rhythm to an interesting living area.

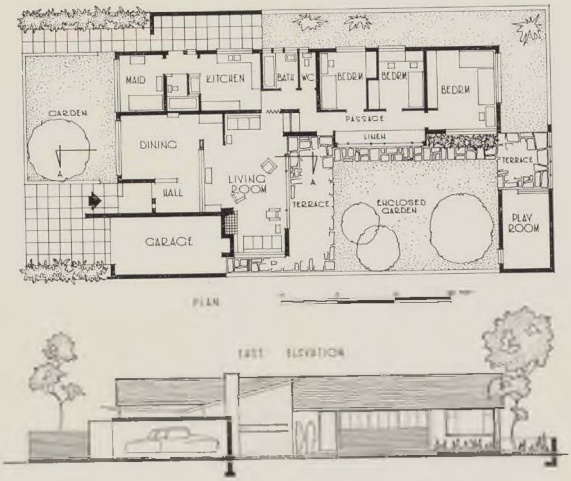


View of living room looking towards fireplace recess and showing book fitting posed among windows.



Photography by "Cape Times" Service.

View of house from main road.



Interior showing panelled recess.



Supplement to South African Architectural Record January 1955.
69 (03) Series DIS 25.

INFORMATION SHEET

ISSUED BY THE NATIONAL BUILDING RESEARCH INSTITUTE
OF THE SOUTH AFRICAN COUNCIL FOR SCIENTIFIC
AND INDUSTRIAL RESEARCH.

European Labour Hours in the Construction of a Native House

121 Q: How long does it take average European artisans to erect the walling of a typical native house when the walls are constructed of

(1) 9" solid external brick walling, 4½" internal walling;
(2) 9" brick on edge cavity external walling, 3" brick on edge internal walling;
(3) 4½" brick plastered externally, 3" brick on edge internal walling.

A: The table shows the results obtained from a study carried out at Vereeniging on the erection of three groups of 10 houses each. It must be stressed that these are actual times observed and no adjustments have been made to take into account variations in idle and non-productive time.

The figures for the 4½" plastered walling include the time spent on plastering and are slightly higher than would normally be expected, as the output on the plaster work was only an average of 20 square yards per man per day.

The studies showed that the average output of bricks per man, based on an 8 hour working day and averaged over the whole house, was as follows:

9" solid walling, 700 bricks per day;
4½" walling plastered, 630 bricks per day;
9" brick on edge cavity walling, 600 bricks per day.

The ratio of skilled workers to unskilled workers was about 1:1.5. The slight variations in this ratio are not significant but are due to the fact that the full gang of labourers was not present all the time. Thus there is very little difference in the amount of unskilled labour required on these three types of construction.

It can be seen from the table that on the two "lifts", floor to window sill height and sill height to wall plate height, the brick on edge type of construction requires the least labour, whilst the amount of labour required for the 4½" plastered brick is nearly the same as that required for the 9" solid brick type. However, when the gables are reached the 4½" plastered brick requires the least labour because less care has to be taken with the cutting to gables in this method. Thus, if brick on edge construction is used, a saving of almost 10% on skilled labour hours can be obtained against 4½" brickwork plastered and almost 23% against 9" solid brickwork.

TABLE 1

Brickwork times for the construction of the NE 51/9 type Native house from floor level upwards.

Operation	9" solid walling		9" brick on edge cavity walling		Plastered 4½" walling	
	Hours skilled	Hours unskilled	Hours skilled	Hours unskilled	Hours skilled	Hours unskilled
Brickwork to window sill height	41·750	60·600	33·240	51·800	37·695	57·372
Brickwork to wall plate height	48·767	81·400	40·600	62·500	47·878	75·162
Brickwork to Gables	24·067	41·000	18·340	26·820	16·260	24·726
Total	114·584	183·000	92·180	141·120	101·833	157·260
Dilution of Labour	1	1·598	1	1·531	1	1·551

The Purpose of the Under-ream in Piled Foundations

122 Q: What is the purpose of the under-ream in piled foundations for expansive soils?

A: The purpose of the under-ream is to provide an anchor against the upward frictional forces developed along the side of the pile as the soil expands. A very secondary purpose of the under-ream is to spread the load but, particularly in the Free State Goldfields area, the allowable bearing capacity at the depth of founding is usually sufficiently high to carry the full load by normal end bearing, without requiring an enlarged base.

Supplement to
South African Architectural Record.
January 1953.

Artificial Lighting

123 Q: Is the heat output of lamps an important consideration in the design of shades and fittings?

A: The heat output of the filament lamp is very high; of the total energy emitted, 8% is light and the remainder, (92%) is heat, of which two-thirds is in the form of radiation. Therefore, when designing a fitting for a filament light-source, care should be taken that ample provision is made for ventilation, and that inflammable materials, and those which have low softening temperatures, are kept clear of the lamp.

With fluorescent lamps, the heat output is low: 16.5% of the energy is light and 83.5% is heat, of which half is in the form of radiation. Although not nearly so bad as with filament lamps, the radiant heat can be uncomfortable, especially if the lamps are placed too close to the body. As the lamps have a low surface temperature (+ 120° F.), practically any material may be used for the fitting, even if placed in contact with the lamp itself. However, the low operating temperature makes the lamp susceptible to changes in air temperatures, e.g. exposure to cold draughts lowers the light output and, conversely, if the tube is allowed to overheat, the length of life of the lamp is reduced. As this also applies to the running gear (ballast, starter, etc.), special care should be taken to reduce overheating.

Prestressed Concrete

This is the first of a proposed series on prestressed concrete.

124 Q: What is prestressed concrete?

A: It is well known that, although concrete has a high compressive strength, it is very weak in tension and, before concrete can be used as a structural material, some form of integral reinforcement has to be provided which will give the tensile strength required. In the case of a simple reinforced concrete beam, the concrete is capable of resisting the compressive stresses developed in the upper portion of the beam, but sufficient mild steel reinforcement has to be provided to resist the full tensile force in the lower portion of the beam.

Another method of overcoming the tensile weakness of concrete is to impart to the material an initial compressive stress of such a magnitude as to balance the tensile stress developed under working loads. This is the principle employed in what is known as prestressed concrete.

The initial compression in the concrete is usually created by the contraction of stretched steel wires anchored in, or at the ends of, the beam. These wires are of high tensile strength steel and are strained by means of hydraulic jacks.

The two systems of prestressing in common use are:

(*a*) the pre-tensioning system, in which the wires are stretched between fixed bearing plates before the concrete is cast around them, the anchorage being by bond between the wires and the concrete;

(*b*) the post-tensioning system, in which the jacks bear against the hardened concrete and the wires are finally anchored by some system of wedging at the ends of the beam.

Sewer Connections

125 Q: How can a house connection to a sewer be made without risk of breakage and leakage in areas subject to heaving or other foundation movement?

A: Most house connections are made with earthenware pipes jointed with cement mortar. If heaving or other relative earth movements occur under a house, there is a tendency for this rigid pipe system to fracture, so causing leakage of water, which may induce further foundation movement, frequently resulting in very severe cracking of the house walls and floors. Experiments carried out in Vereeniging have shown that if bituminous materials are used for pipe jointing instead of cement mortar, considerable deflections can occur in the pipes without causing leakage. In a test installation, a heaving of about 2" was induced under jointed pipes. The cement mortar jointed pipe failed early in the test, but most of those jointed with bituminous compounds have not yet shown any signs of failure.

Although a wide range of bituminous materials could probably be used, it is advisable to select the harder varieties, in view of the risk of root penetration. Bitumen of 4/25 penetration and plain or filled pitches with ring and ball softening points of 55 to 60 have proved satisfactory in the experiment mentioned above.

The joints were made by forming a clay ring round the socket, in which the spigot was centralised by a ring of yarn, and pouring the hot material into a funnel formed on top of each joint. The indications were that costs should be of the same order as for cement joints.

Copies of this sheet may be obtained on application to the Director, National Building Research Institute — P.O. Box 395, Pretoria.

W.P.—8530—2/11/52

BUILDING SCIENCE PUBLICATIONS

SOUTH AFRICAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH.
NATIONAL BUILDING RESEARCH INSTITUTE.

REVIEW OF RECENT PUBLICATIONS

Bulletin No. 6, Pretoria.

This bulletin contains six papers of which a summary or abstract is given in each case.

1. *Native Housing Research in South Africa.* This is a joint paper prepared by F. R. Rodseth, Under-Secretary (Administration), Native Affairs Department, F. van Heerden, Secretary, National Housing Office, and J. E. Jennings, Director, N.B.R.I.

The paper presents a brief summary of the whole programme of research at present being undertaken, including the pre-planning of housing based on social and economic research, the design and layout of housing schemes, the design and planning of the house itself and studies relating to the costs of the actual buildings. In all this work close liaison exists between the three organisations mentioned.

2. *Measurement of Ventilation Rates in Dwellings, using the Tracer Gas Technique, with special reference to the Kata Thermometer Method,* by J. F. van Straaten, Research Officer, Functional Efficiency Division.

If the Kata thermometer method is to be used for measuring ventilation rates with a high degree of accuracy, it is important to eliminate all factors influencing the Kata thermometer zero, and to ensure proper mixing of the tracer substance with the air in the room. If these precautions are taken, it is estimated that the accuracy with which ventilation rates can be measured by this means, under favourable practical conditions, is of the order of 15 to 20 per cent. Under steady state conditions, however, the accuracy is ± 7 per cent.

3. *The Applicability of the Consolidation Theory to the Calculation of Foundation Settlements under South African Conditions,* by B. A. Kantey, Research Officer, Soil Mechanics Division.

Results of full-scale field tests in the Durban area are discussed, to show that the consolidation theory can be applied with reasonable confidence in South Africa, where areas of saturated sub-surface conditions are found along the coastal strip.

4. *The Significance of some Physical Properies of Non-Hydraulic Limes,* by T. L. Webb, Research Officer, Materials Division.

The physical properties of limes are of importance since they largely influence the behaviour and performance of mortars and plasters. The properties of fineness, surface area, consistency, plasticity, workability, water retentivity and soundness are discussed in relation to building practice, and tests to assess these properties are briefly described Routine testing of lime is of considerable benefit to both producer and consumer.

5. *Details of some Italian Hollow Block Floors and Roofs,* by Chas. A. Rigby, Principal Research Officer, Engineering Division.

Examples of some Italian methods of constructing floors, using hollow burnt clay blocks, and requiring no shuttering, part shuttering or full shuttering, are given. The method of design is briefly described.

6. *Some Practical Aspects of the Thermal and Ventilation Conditions of Dwellings,* by A. J. A. Roux, Principal Research Officer, and J. F. van Straaten, Research Officer, Functional Efficiency Division.

During an experimental study of the thermal and ventilation conditions in a typical dwelling under summer weather conditions, it became apparent that the interior thermal conditions are almost completely determined by the outdoor climate, the thermal properties of the structural elements and the ventilation rate.

The air temperatures in the various rooms of a house lie within a narrow band, so that a mean temperature could be determined for the whole house. Furthermore, there appears to be no significant "cooling" of the outdoor air in its passage through the house during the sun-hours of the day, but appreciable "heating" is evident during the night.

With insufficient ventilation openings immediately below the ceiling level of houses with corrugated iron roofs, air stratification is likely under conditions of high insulation, resulting in ceiling temperatures much higher than the mean air temperature in the room.

The results also show that ventilation openings, such as window fanlights and sashes, have large effective openings as compared with those of window and door-joints and air-bricks, so that the ventilation rate of a room is greatly increased by opening a window fanlight or sash.

Bulletin No. 7, Pretoria.

The five papers included in this publication are explained by their respective abstracts.

1. *Site Selection in Non-European Housing Estate Layouts,* by D. M. Calderwood, Senior Research Officer, Architectural Division.

The importance of site selection for low cost housing estates is discussed, with reference to cost reduction and to the creation of environment. Important aspects dealt with are: zoning, taking legislation into account; health considerations; site location in relation to transportation and services; topography and soil conditions; social surveys, revealing the number of people likely to be housed, rent-paying capacity and other factors; and, finally, the area and shape of site. A check-list is appended.

2. *The Planning of Non-European Residential Areas in South Africa,* by D. M. Calderwood, Senior Research Officer, Architectural Division.

The provision of amenities in residential areas is most important if the area is to function properly. The economies of a layout are very dependant upon the density achieved in the plan, but, in arriving at higher densities, amenities must not be reduced. A good plan is the balance of economies and the creation of a good environment.

3. *The Costs of Native Housing — Present-day Costs of Brick Houses at Vereeniging,* by A. L. Glen, Senior Research Officer, Costs Division.

In an attempt to reduce costs of individual Native dwellings, the costs of 1,000 houses at Sharpeville, Veree-

niging, were analysed and modified according to prices ruling in April - May, 1951. This cost breakdown consisted of: (*a*) the individual costs per house for materials, labour and overheads; (*b*) the cost of each constructional element making up the house (foundation, superstructure, roofwork, etc.). The analysis shows that no striking cost reduction can be made by reducing the cost of any single constructional element, and that appreciable saving can only be made by an aggregate of small savings on many elements; saving can also be made by conducting a continuous housing programme without any stoppages or breaks in the work.

4. *The Resistance of Thin Walls to Rain Penetration.*—A review of literature by S. J. P. Joubert, Research Officer, Functional Efficiency Division.

The required properties of material used for building thin waterproof walls are discussed. Factors such as brick suction, water retentivity, plasticity and the lime cement ratio of mortar are all important factors in relation to the rain resistance of a wall, and are discussed in the light of existing literature. Finally, some possible methods are given whereby the defects of brick walls as regards rain resistance may be corrected.

5. *A Simplified Method of Calculaitng Artificial Lighting*, by W. M. H. Rennhackkamp, Research Officer, Functional Efficiency Division.

An instrument in the form of a slide rule, based on the interflection theory and tables, for calculating the average illumination and lumens in artificial lighting, is described.

Bulletin No. 8, Pretoria.

The five papers of this bulletin are given with their respective abstracts.

1. *The Properties and Uses of Lightweight Foamed Slag Concretes*, by N. Stutterheim, Principal Research Officer.

Foamed blast-furnace slag is a stable, inert, lightweight material, free from the risk of unsoundness. The properties are discussed in relation to its use as concrete aggregate and as a loose-fill insulator in buildings. The densities and strengths for various mixes at ages from one to ninety days are given and recommendations made for mixing, compacting and curing foamed slag concrete. Some data are given on the shrinkages of typical mixes, and the application of foamed slag concrete to flooring, walling and roofing is discussed.

2. *The Nature of Heaving Foundations: Some Experimental Installations in the field at Leeuhof, Vereeniging*, by A. K. Steyn and L. E. Collins, Research Officers.

Experimental work, designed to throw light on the mechanisms of heaving in unsaturated clay soils beneath buildings, is being conducted in the field at Leeuhof, Vereeniging. Methods of overcoming the cracking of buildings founded on these soils are being investigated.

3. *The Measurement of Temperatures, Moisture Contents and Electrical Potentials in the Soil under a Building at Vereeniging*, by L. L. van den Heever, Scientific Assistant.

Full-scale observations of the soil temperature, moisture content and electrical potential are being undertaken below a specially built house on an expansive clay foundation. The measuring units, their disposition, and the difficulties encountered are described and typical results of tests are illustrated. A full discussion of the results with conclusions will be published in a later paper.

4. *Cost Norms for Native Housing*, by A. L. Glen, Senior Research Officer, Costs Division.

The "Cost Norm" for Native Housing is defined as the cost of the National Housing and Planning Commission type Native House NE 51/9, in standard construction. Detailed studies at Vereeniging have given a complete breakdown into material, labour and overhead costs. These costs have been adjusted to ruling prices in 19 centres giving the "Regional Cost Norms" and a proposed Native Housing Cost Index related to the costs as on January 1st, 1952, will give variations with time. Reduced Cost Norms cover cost-reducing variations in specification. These norms are useful in estimating costs and judging tenders.

5. *A Study of the Socio-Economic Status of Native Families in Payneville Location, Springs*, by H. J. J. van Beinum, Assistant Research Officer, Atchirectural Division.

A description is given of the methods and results of a socio-economic survey conducted in the Payneville Native Location. The purpose of the survey was to obtain data for the planning of a new Native township, the information was required on the number of houses of different size needed and the rent-paying ability of the families to be housed. The conclusion is reached that the population is made up of three economic groups, each of which requires a different class of housing, each class requiring a variety of house sizes. (Classes are listed as economic, sub-economic and sub-sub-economic).

NOTES & NEWS

TRANSVAAL PROVINCIAL INSTITUTE

New Member: D. N. Ossher (Practising).

Partnerships: Mr. H. Taljaard has been admitted to partnership with Messrs. Geers & Geers & Partners, practising at 601, Hollandia House, Johannesburg.

Mrs. N. H. Sinclair has resigned from Messrs. D. M. Sinclair & Partners, and is now practising on her own account at 61 Alliance Building, New Street North, Johannesburg.

CHAPTER OF S.A. QUANTITY SURVEYORS TRANSFERS

The following members have transferred from salaried to practising membership: Messrs. J. E. Hammerton and E. A. Walker.

The following member has transferred from retired membership to practising membership: D. S. Mann.

PARTNERSHIPS

Mr. R. H. G. Dunlop has joined the firm A. Douglas Dunlop, practising at 74 Trust Buildings, Gardiner Street, Durban.

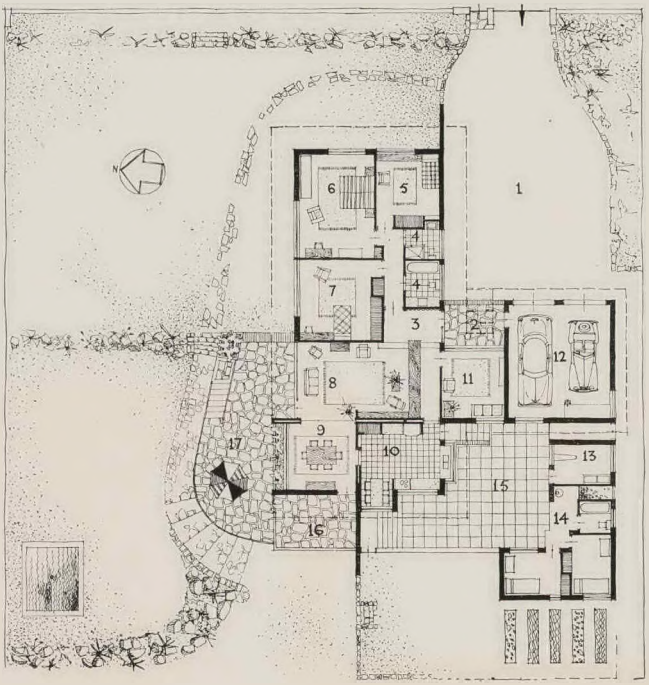
Mr. A. J. Lee and Mr. J. E. Hammerton have joined partnership and are now practising as Messrs. Lee and Hammerton at 9 Edmonds Road, Durban.

Mr. W. E. Winstanley has been admitted to partnership with Messrs. Wood and Ward, now practising as Messrs. Wood, Winstanley and Ward at 1 Norvaal House, Bulawayo, Southern Rhodesia.

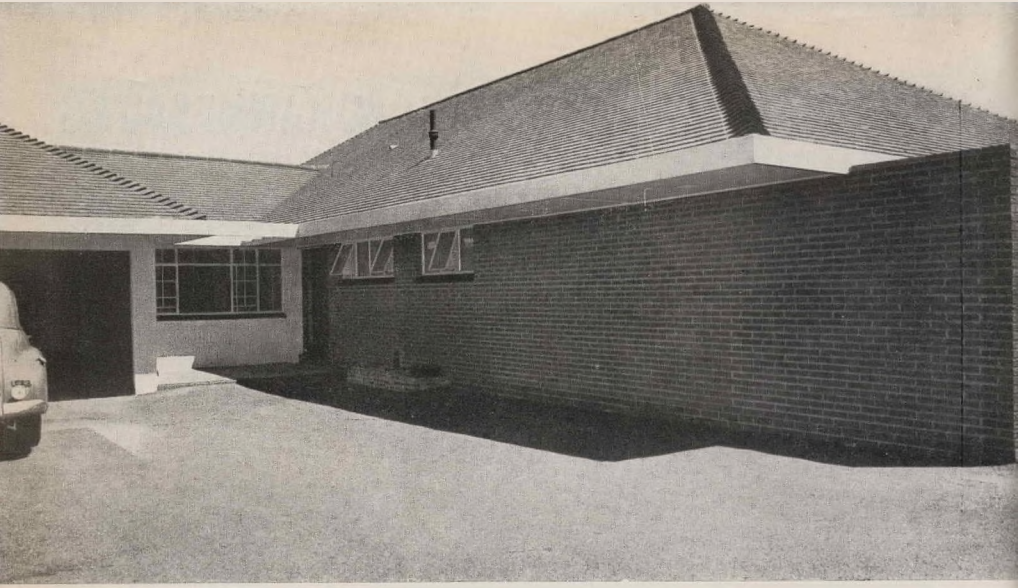
Mr. B. D. Shelver has been admitted to partnership with Messrs. Sinclair, Middleton and Botha, and is practising at 41 Colosseum Buildings, East London.

HOUSE IN EMMARENTIA JOHANNESBURG

ARCHITECT GILBERT HERBERT



1. MOTOR COURT
2. ENTRANCE PORCH
3. ENTRANCE HALL
4. BATHROOMS
5. SON'S BEDROOM
6. MAIN BEDROOM
7. DAUGHTER'S BEDROOM
8. LIVING ROOM
9. DINING ROOM
10. KITCHEN
11. STUDY-GUESTROOM
12. GARAGE
13. LAUNDRY
14. SERVANTS
15. YARD
16. DINING TERRACE
17. TERRACE



View from drive looking towards entrance.

Photography by B.R.S.

SITE

The site, which measures approximately 114 feet by 187 feet, is situated on a quiet street in Emmarentia. It is approached on its narrower eastern side, and slopes at a fairly even rate towards the west, the total fall over the length of the house being some five feet. There are fragmentary views of Emmarentia Dam towards the west, and long uninterrupted views of greenery to the north-west.

PROBLEM

The problem was to house a family with two children in a comfortable contemporary manner, while at the same time working within the limits of a conventional approach implicit in the normal Johannesburg client's pre-occupation with the possibilities of re-sale. This limitation, and the restrictive conditions of the township regulations, have combined to preclude experimentation in roofing form, planning and methods of construction; the house, therefore, while it achieves a reasonableness of form, is prevented from attempting to break any new architectural ground.

SOLUTION

The programme specified a rigid separation between living and sleeping zones, so that the latter might be cut off completely at night.

The living area, which has been restricted in size in view of the need for economy, is planned visually as one area separated into different functions of hall, servery, living and dining by means of such space-articulating devices as the change of floor and ceiling level, the cabinet fitting seven feet high, and the sliding wrought-iron screen.

The kitchen is comprehensively equipped with built-in furniture, and incorporates a breakfast nook whose window commands a fine view of Northcliff Hill. Additional cupboard space is provided in the fitting separating the servery, leading to the hall, from the living room. On the servery side, this fitting is fitted with lock-up cupboards to augment kitchen and general storage; a telephone recess, lined with acoustic tiles, and fitted with built-in seat and shelf; and a cloak cupboard for visitors at the hall end. The living room side includes display facilities for the owner's collection of small ornaments; a sliding hatch through to the telephone; and a mural painting by Miss Marjorie Long, based upon one of the harlequin pictures of Picasso. This, incidentally, has provided something of a shock to an area which has apparently not yet come to take Picasso in its stride,

and the mural is known locally as "the Thing". Storage for books is also provided in the living room, together with a liquor cabinet; heating is by a "Thermovent" space heater. Lighting throughout this area, except for three spot lights in the hall, is concealed fluorescent.

Drama of materials, texture and strong colour is confined to the living area. The all-purpose study and the three bedrooms are more restrained to provide a quicker, more neutral, background for living, in an attempt to create a balanced environment out of the conflicting needs of man for rest and for stimulation.

Straightforward planning for convenience is the keynote of the sleeping zone. Corridor space is kept down to a minimum, ample built-in storage space is provided, and all bedrooms face either east or north. A small secondary bathroom equipped with shower cubicle, washbasin and w.c. has the effect of giving the house all the amenity of a two-bathroom home, while occupying a minimum area. The main bathroom is fitted with a built-in washbasin with a six foot counter-top, drawer space, a soiled linen cupboard, and two large mirror-fronted medicine cabinets flanking a fixed central shaving mirror over the basin itself.

The house is well equipped for outdoor living. A large unroofed terrace opens off the living room, with shade provided by a colourful sun umbrella; a dining terrace opens off the dining room. Below this terrace a minor excavation has enabled the building of a tennis shelter. The fall of the ground has also enabled the incorporation of a room below the kitchen, which is accessible externally. This was originally intended as a workshop, but the owner has so far been unable to resist the competing temptations of the tennis court and a deck chair on the terrace, and the workshop, awaiting equipment, is now serving as a most useful garden store. Servants' quarters, a laundry, and a two-car garage complete the accommodation provided.

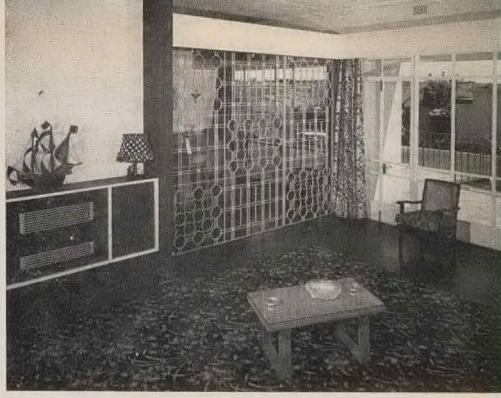
FINISHES

Externally

Walls: Rough-cast plaster colour-washed pink.
Plinth and screen walls: Plum-coloured facing, and two-inch plum-coloured rustics.
Roof: Chocolate-coloured Broseley tiles.
Paving: Glasto.

Internally

Floors: Muave wood block to living and sleeping areas; asphalt tiles to kitchen and bathrooms.
Joinery in living area: Klaat.
Ceilings: half-inch softboard, V-jointed.
Walls: plastered and painted with washable distemper.
The house was built in 1950-51.





Top: View of lounge looking towards grille, dividing lounge from dining room. Centre: View showing murals on lounge fitting. Bottom: View from north-west showing dining terrace.



CRACKING OF BUILDINGS IN THE ORANGE FREE STATE

This paper discusses the causes and prevention of cracking of buildings in the Orange Free State. It is presented in the form of questions posed by D. M. Calderwood, head of the Architectural Division of the National Building Research Institute, and answers provided by C. A. Rigby and B. A. Kantey, heads of the Engineering and Soil Mechanics Divisions respectively.

Q. A number of my architectural associates have spoken to me about the cracking of buildings in the Free State. They are worried about the fact that recommendations from the National Building Research Institute have not produced the results claimed.

A. The key to the problem is in the word *recommendations*. The N.B.R.I. has no authority in a particular case and can only offer advice to those responsible for the work. In all the experiments carried out in the Free State, we have had little or no direct control of the design and, even more important, of the supervision during building operations. Site inspections have indicated that a large proportion of failures are due to the design not fully embodying the principles laid down by the N.B.R.I., and or to bad workmanship.

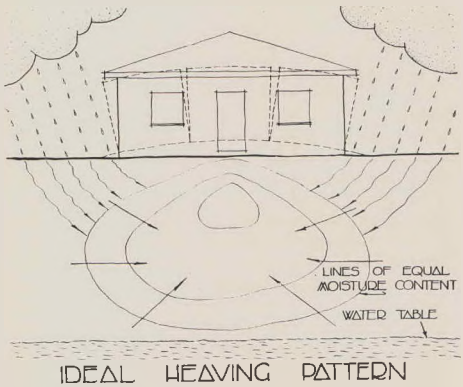
Q. This is a hard statement and looks as though those responsible have not fully understood the principles involved: is there a simple explanation of these basic principles?

A. Before going into the design principles, it would be as well to obtain an understanding of what causes the stresses resulting in the cracking of buildings. In broad terms the failures are caused by the coverage of the soil when the building is erected. This coverage interferes with the natural movement of moisture in the soil and results in an increase in moisture content of the soil under the structure. If the soil is of the type that swells with increase in moisture content, then the ground under the structure heaves and pushes the building upwards. Since the structure is not, normally, designed to withstand this upward force, the building cracks.

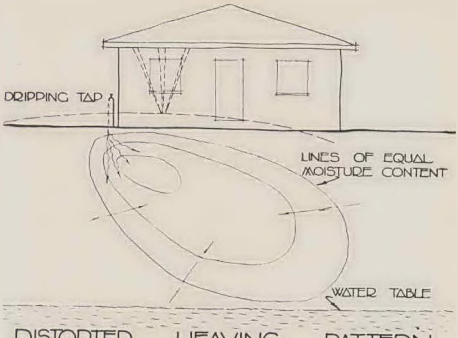
Q. If the area under the building rises, surely then the only condition would be that the structure would go up with the soil movement or heaving; I cannot see where any additional stresses are imposed.

A. If the movement were uniform this would be true, but this is not the case. Since the effect of the coverage is, in the ideal case, most marked at the centre of the structure, becoming progressively less towards the perimeter, the resultant heaving is greatest in the centre. The heaving formation is, in fact, dome-shaped, giving differential movements at various points. This can best be explained by reference to fig. 1. Of course, this is the idealised case and in practice certain other factors may distort the pattern. If a standpipe at the side of the house were left dripping, the pattern of movement would change to something like that shown in fig. 2. In addition, other factors such as down pipes, broken drains and the shape of the building itself can change this heaving pattern (fig. 3).

FIG. 1

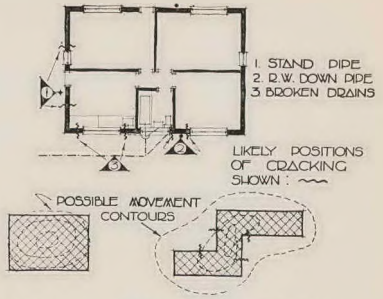


IDEAL HEAVING PATTERN



DISTORTED HEAVING PATTERN

FIG. 2



CAUSES OF DISTORTION

FIG. 3

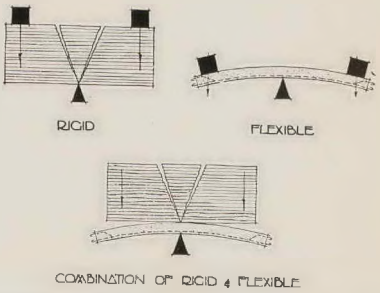
Q. Is it not possible to make the foundations strong enough to resist these heaving forces? I was thinking of re-inforced concrete foundations or a raft foundation.

A. The object of any solution is to prevent the walls from cracking. A brick wall is a very rigid structure which can only withstand a very small deflection before cracking. A re-inforced foundation, or raft, is strong enough to carry the loads and forces imposed. However, due to its relatively shallow depth, it is a flexible member which will safely undergo, at working stresses, deflections far in excess of those which the wall can tolerate. This type of foundation will therefore not prevent cracks (fig. 4).

Q. What about a sand cushion which seems to be so much in favour with the builders in the Orange Free State?

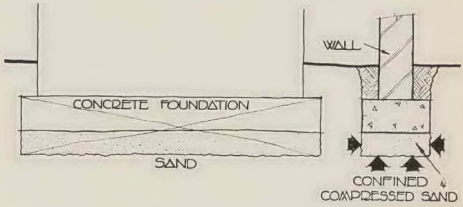
A. The standard method is to put a six-inch layer of sand in the bottom of the foundation trench and cast the foundation on that. This is supposed to absorb the heaving. The point to remember here is that this sand is confined by the walls and bottom of the foundation trench and the base of the foundation itself. The sand itself acts as a rigid and flexible beam (fig. 5).

Q. That sounds all very well but how is the architect, who has been robbed of the standard methods of providing foundations to structures, to face this problem with any degree of confidence? It appears to me that one must build a double-storey house without a ground floor so that the soil is disturbed as little as possible. This would mean building one, two or four columns and cantilevering the house off this minimum foundation— sort of Le Corbusier solution (fig. 6).



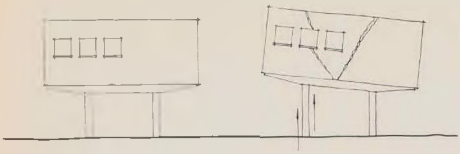
EFFECT OF FLEXIBILITY OF FOUNDATIONS

FIG. 4



SAND BED

FIG. 5



STRUCTURE SUPPORTED ON MORE THAN THREE COLUMNS

FIG. 6

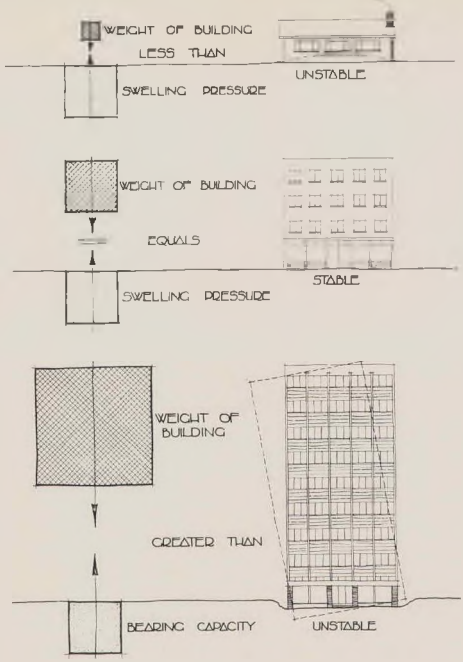
A. No, this is not the complete solution. Anything over three columns can still allow the structure to crack if any one column tends to push the structure out of plane. There are two possible basic solutions. Either one must prevent harmful differential movement or use some form of flexible construction which will allow the structure to distort without disfigurement.

Q. What exactly is meant by this flexible construction?

A. Basically, the idea is not to fight against nature. If the soil wants to move, you allow your structure to move with it but prevent disfigurement by the provision of construction joints where relative movements will not be unsightly. This can be done either by splitting your design into small units which can move relative to each other, or by splitting your walls into panels which can again move relative to each other and thus break the differential movements down into hundreds of small, barely noticeable, movements.

Q. It sounds feasible, but for dwelling houses, it does not appeal architecturally. I can foresee possible trouble with rain and wind penetration but, more important, it does look like limiting the designs, particularly where large glass areas are required. What about the other solution?

A. If one can prevent differential movement, no trouble will occur. This can be done in one of two ways. The first and, on the surface the most obvious method, is to design your structure so that the loading is of the same order as the swelling pressures developed by the soil in expanding (fig. 7). This is, however, an impracticable solution, particularly for small structures, as no satisfactory method has yet been found of calculating the swelling pressures in relation to the structure. Other technical complications such as distribution of loading with depth enter into the problem too, but they fall beyond the scope of this discussion. The second basic method is to found below the region affected by the change in moisture content.



EFFECT OF LOADING

FIG. 7

Q. Now you are talking of something that I can understand. I presume you mean the piled foundation?

A. Piling is one form of solution where the source of movement is comparatively deep-seated, but the application of the piled solution is somewhat different to normal piling practice. In this case, the frictional effect of the soil on the pile will tend to pull the pile upwards with the soil and some form of anchor must be provided in the form of a bulb at the bottom of the pile. This is the under-reamed pile of which you have no doubt heard (fig. 8). In addition to this, the structure itself must be kept clear of the ground or the advantages are lost. This would mean suspended floors and grade beams free of the surface of the soil (fig. 9).

Q. Have there not been failures with this method?

A. Yes, but wherever such failures have been investigated, it has been found that the failures have occurred

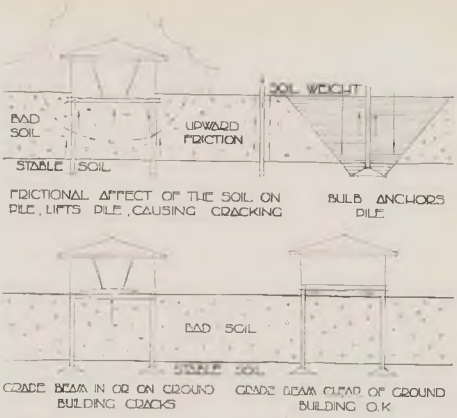


FIG. 8

due to neglect of certain basic factors. Either the grade beams have not been kept clear of the ground or else some obstacle, such as a brick carelessly left under a grade beam, has allowed the swelling soil to crack the grade beam and hence the walls. Other cases of failure have occurred through not carrying the piles deep enough or not under-reaming them.

Q. That sounds reasonable but are not the costs for this type of solution somewhat high?

A. Yes, that is true for the moment, but it is hoped that these costs will come down with competition and experience. What must not be forgotten though, is that even with these costs, while they may look high at the moment, may be negligible in comparison with the maintenance costs of a badly cracking house. However, in areas such as Brits where the trouble is not so deep-seated, it may be economically possible to excavate the bad material and replace with good material. Alternatively, this could be done beneath foundations only and the structure kept clear with elevated grade beams and suspended floors. Once again costs enter into this type of solution (fig. 10).

Q. There certainly seems to be more in this than meets the eye. What I am really looking for is some form of stable platform on which I can design any structure thereby giving freedom of design. I can see that this can be done by a concrete platform on under-reamed piles or by excavation but can one not design some form of rigid raft?

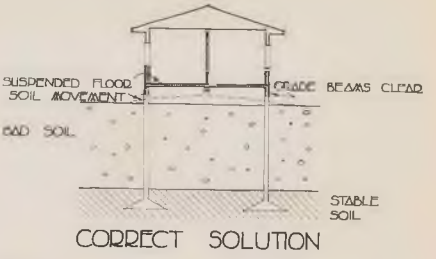


FIG. 9

A. Why not make your whole structure rigid and let it float on the soil somewhat after the style that a ship floats on water? This can be achieved by designing your walls as deep beams and using re-inforcement in the brickwork to make them rigid.

Q. That sounds reasonable enough to me but what about wall openings and different shapes of dwellings? I can foresee trouble there.

A. Yes. The allowance for openings brings in many structural complications and would necessitate the co-operation of a structural engineer. We can agree, however, that you are limited to rectangular shapes or combinations of rectangles and that your wall openings are limited.

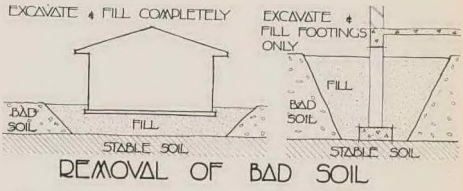
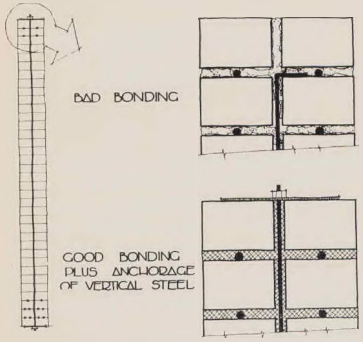


FIG. 10

Q. Well that would appear to limit the use of re-inforced brickwork to Native housing and certain standard types of housing schemes. It does not appear to solve my problem as an architect, as it would immediately cut out any house with a large expanse of glass but, within these limitations, has this method proved successful in the field?

A. In many cases, yes, but a number of failures have also been observed. These have mostly occurred where the methods recommended have not been properly carried out, and the largest number of failures can be attributed to lack of bonding of vertical steel (fig. 11).

It has also been found that failures have occurred where the differential movements have been accentuated by such factors as inadequate drainage of surface water and broken drains. However, a comparison of the differential movement and the cracking developed in these cases has shown that the provision of re-inforced brickwork has materially reduced the cracking.



REINFORCED BRICK MASONRY FAILURES & SOLUTION

FIG. 11

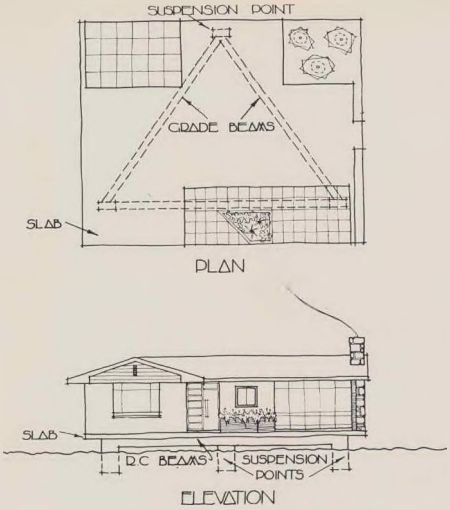
Q. It would appear therefore as if re-inforced brickwork is, at the very least, a reasonable preventative measure with a good chance of success. But I must come back to my freedom of design considerations. I am much more interested, as I said before, in a stable platform. As an alternative to under-reamed piles, can you not provide an economical raft stiff enough to eliminate differential movements?

A. Yes, one could build a re-inforced slab on three foundation pedestals which would then allow the house to move in a plane, but, dependent on the overall size, the cost may be considerable. It can, however, be done and a careful structural analysis of each proposed structure could produce the most economical positioning of the pedestals to reduce cantilever stresses in the slab to a minimum (fig. 12).

Q. Would this be more economical for a double-storeyed house as the cantilevering would be reduced?

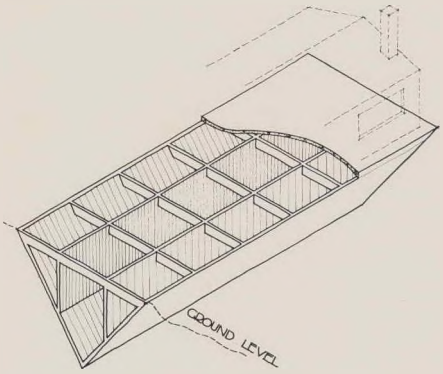
A. That is correct.

Q. What about some form of inverted roof truss slab whereby the vertical members could produce the rigidity? (fig. 13).



THREE POINT SUSPENSION

FIG. 12



RIGID RAFT

FIG. 13

A. That might be made to work but again the cost would determine its applicability. The depth of the vertical members would determine the rigidity and we think this depth would have to be varied with the coverage and hence probable differential movement. It is however a feasible proposition.

I would like to sum up the points in order to be sure that I have grasped the important facts in regard to building on heaving soils. Firstly, it would appear that there is no easy and cheap solution to the problem, in so far as small architecturally-designed houses are concerned. In the case of large multi-storey buildings, the extra cost is not noticed in the total, amounting to about one per cent. whereas in the single-storey house the percentage increase in total cost may amount to as much as ten per cent. The main point to be remembered is that, although the initial capital cost is increased, it must be considered against the maintenance cost of patching up unsightly cracks, which worry both the client and the architect. These maintenance costs can be as high as three per cent. of the capital cost per annum. Secondly, the greater the demand for design freedom, the larger the expenditure will become, but if each design is considered on its own merits and co-operation exists between architects and structural and foundation engineers, the most economical and successful solution will be found.

CORRESPONDENCE

"PICTURES BY . . ."

Dear Sir,—In your August issue you published an article entitled "Pictures by . . ." Are they pictures or is there not another name for them? Should pictures be insufficient to describe themselves and be "dependent on their titles" to become thereby more or less understandable?

If this be so, then the last illustration (page 208), a mixture of some lines and blacking-in associated with two prosaic entertainment tickets is not made clearer by its title. The production appears to me to be a sort of drainage plan with septic tank, manhole, and junctions for bath, W.C. and basin.



Again, if titles are essential, why not one on your cover page? Not everyone turns to un-numbered page in front of 188. I have studied the effort and believe it depicts the "Ghost Scene from Hamlet":

Plan of the Castle of Elsinore, coloured red.
Time between 12 and 2.
At top of sheet "The Ghost".
At left foot an unprepossessing Hamlet, dressed in orthodox black but wrongly dated by the hair in a Georgian pigtail.

Why use the word "Collage"? It is not found in English dictionaries; and as South Africa has so many languages—Xosa, Zulu, Sesuto, Portuguese, Afrikaans and English—why revert to French? Years ago the French language was made illegal out here.

Further, may one ask for more simple language from your contributors. The late Mr. Gladstone—one of the world's finest linguists, said that language should be used with the shortest words and in the shortest possible sentences.

Some that you print, when read and even when re-read several times, are largely unintelligible.

Statements such as "tyrannous control", "hurling the volumes out upon him", "excites his tactile responses", "transcending the limitation of the medium", "fanatical emotion", "shocking the visual responses chiefly by virtue of its frozen passion", are all contained in some ten continuous half-page lines.

Yours faithfully, "PUZZLED".

("Puzzled's" reaction to the examples of the art of fantasy which appeared in our August issue is gratifying. This form of art expression is essentially designed to stimulate imagination and evoke the observer's response This it seems to have achieved with some technical success.

The writer of the article "The Nature of the Baroque" would be the first to agree that language should be as precise and definite as possible. However, when describing a flowery and profuse architecture, such as the baroque, it is extremely difficult to evoke a simple word picture of what, after all, is a very complicated style, and this has undoubtedly affected the language.—EDITOR.)

THE ARTIST REPLIES

1. We live in a totally practical and commercial world which is in the grip of down-to-earth materialism. It is the job of the creative artist to re-discover the worlds of imagination, magic wonder and phantasy and to fight the commonplace vision.

2. The artist is not necessarily bound by reason. He is free to create a fairy-tale world where anything can change into anything else at a moment's notice.

3. Art is not necessarily concerned with the tragedy of human life or with strict adherence to nature and her cycle—rise, peak and decline.

4. Technically a picture is first and foremost a pattern, a balance of light and dark shapes and forms and lines and colour. The fact that it forms itself into something we have seen before is secondary to the perfect balance of these elements.

5. To me the simple drawing of a symbol such as a circle for a head with one or two small circles within it for eyes has a stronger impact than any attempt at realism.

6. The artist cannot imitate life; he must interpret it with abstract marks. His medium is capable of this.

7. A careful copy of nature 'as it is' denotes 'skill' but may tend to kill inspiration; anyway the camera does it very well in a split second.

8. There is a great deal which is purely instinctive in painting and concerned with the imagination and the unconcious.

This is **not** an explanation of my paintings but a few thoughts on art.—CHARLES ARGENT.

PROVINCIAL BUILDING WORKS.

LIST OF ACCEPTED TENDERS FOR MAJOR SERVICES FOR QUARTER ENDING 30th JUNE, 1952.

SERVICES	ARCHITECTS	QUANTITY SURVEYORS	CONTRACTORS	AMOUNT
Erection of New School at Townsview.	Mr. B. Janks.	Departmentally.	Messrs. K. H. Schutte & Co. (Pty.) Ltd.	£37,171.0.0
Krugersdorp Monument School: New Girl's Hostel and alterations to the existing hostel.	Mr. J. S. Barnett.	Messrs. Selkirk & Gaisford.	Messrs. Eloff & Setman (Pty.) Ltd.	£47,169.0.0
Erection of New School at Riverview, Middelburg.	Departmentally.	Departmentally.	Messrs. D. Velthuysen (Pty.) Ltd.	£23,215.0.0
Afrikaanse Hoer Meisieskool: Pretoria: Alterations and Additions.	Messrs. Burg, Lodge & Burg.	Messrs. Austin, Stewart & Ellis	Mr. J. Zylstra.	£22,000.0.0
Achlone Girls High School: Johannesburg: Alterations and Additions.	Messrs. Marshall & Paynter.	Mr. H. Muller.	Messrs. O. W. Robins & Son (Pty.) Ltd.	£25,213.0.0
Erection of Robertsham Afrikaans Medium Primary School.	Departmentally.	Departmentally.	Mr. L. Westly.	£37,500.0.0
Amersfoort School: Hostel Additions (Knobel House).	(1) Mr. C. Small. (2) Mrs. Curwen.	Messrs. Law, Labuschagne, Kennedy & du Toit.	Messrs. Atomic Construction Company.	£76,643.0.0
Pretoria General Hospital: Alterations & Additions to Stores, Dispensary, Kitchen & X-ray Block (Contract No. 1).	Messrs. Burg, Lodge & Burg.	Messrs. Austin, Stewart & Ellis.	Messrs. van der Spek & Matthysen.	£8,450.0.0
Lydenburg Hospital: Residence for Medical Superintendent.	Departmentally.	Departmentally.	Messrs. S. F. Barac & Son.	£4,730.9.0
Erection of New School, Three Rivers.	Departmentally.	Departmentally.	Mr. D. B. le Roux.	£27,185.0.0
Erection of the Riebeeck High School, Randfontein.	Mr. H. Vermooten.	Mr. S. D. van der Merwe.	Mr. L. J. van der Westhuizen.	£76,750.19.8
Erection of School and Hostel, Leeuwvallei.	Messrs. van Geemert & Breedveld.	Mr. J. P. Meintjes.	Messrs. Botbyl & Schep (Pty.) Ltd.	£48,244.0.0
Additional Office Accommodation at Coronation Hospital, Johannesburg	Departmentally.	Departmentally.	Mr. F. C. Holton.	£8,951.10.6
Alterations and Additions to Edenvale Hospital.	Messrs. Nurcombe, Summerley & Lange.	Messrs. Hodge & Beveridge.	Mr. F. C. Holton.	£59,889.0.0
Additional Nurses Accommodation. New Kitchen and Dining Hall at Krugersdorp Hospital.	Messrs. Stegman & Porter.	Messrs. Law, Labuschagne, Kennedy & du Toit.	Messrs. M. Klawansky & Co.	£67,525.1.10
New Southern Suburbs Hospital, Johannesburg. (Contract No. 1).	Mr. D. S. Haddon.	Departmentally.	Mr. F. C. Holton.	£33,239.0.0
Nelspruit High School: Erection of Hostel.	Messrs. F. H. Moerdyk, Kosch & Orsmond.	Departmentally.	Messrs. McLachlan Bros. (Pty.) Ltd.	£64,946.0.0
Erection of Waverley A.M. Primary School, Pretoria.	Departmentally.	Departmentally.	Messrs. V. Loggerenberg Bros.	£28,400.0.0
Erection of Waverley E.M. Primary School, Pretoria.	Departmentally.	Departmentally.	Mr. V. Moore.	£28,496.0.0

Journal of the SA Architectural Institute

PUBLISHER:

University of the Witwatersrand, Johannesburg

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