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THE COLOSSEUM THEATRE JOHANNESBURG

Johannesburg's latest theatre, the Colosseum, occupies a whole city block measuring two hundred and seven feet by one hundred and forty feet, with its main frontage to Commissioner Street. The theatre proper is flanked by two blocks of offices.

The Colosseum is an atmospheric theatre, the third of its kind in Africa. It is interesting to note that the idea of building atmospheric theatres first occurred to an architect travelling in Spain, who came across an outdoor travelling theatrical performance in a village street. The scene was colourful in the extreme. The stage was at one end of the street and some of the audience sat on chairs in the roadway whilst others watched from windows in the quaint creeper hung and flowered houses. The stars shone overhead in a sky of velvety blue black.

Through the main entrance doors one enters the Grand Foyer, a great vestibule two stories in height and carried out in a colour scheme in which gold predominates.

The lighting is indirect from panels in the ceiling and tall rectangular lights on each pier. The foyer is not obstructed in any way, the box offices being placed at each side of the seven broad pairs of glass doors leading to the street, so that persons waiting to book will not obstruct others passing in and out of the theatre. At either end of the foyer are staircase halls giving access to the mezzanine promenades and to the main gallery or circle.

Below the foyer and approached from the staircase halls at each end is a vast tea room, the largest to be found in any theatre in South Africa. Beyond the staircase halls are two attractively designed and equipped rooms, the ladies' cosmetic room and the buffet.

The former is treated in sycamore and black velvet panels with a mirror set in each panel lit by a shell shaped light above. The piers are in silver whilst the floor is covered with a silver carpet. The walls of the buffet are panelled from end to end in unbroken surfaces of silver and sycamore. The counter is sycamore with concealed lights and fittings of chromium and glass and the floor is grey rubolineum.

The auditorium measures one hundred and thirteen feet wide by eighty-nine feet deep, and is entered from the foyer by three generous doorways. The circle which overhangs the auditorium by forty-three feet is supported on a heavy steel lattice girder, probably the largest built in South Africa, spanning the full width of the building and located behind the walls of the mezzanine promenade. The proscenium opening is sixty feet wide and thirty feet high, spanned by a reinforced concrete beam nine feet deep, which carries a load of four hundred tons.

The stage is seventy feet high, with provision for "flown" scenery. The curtains and safety curtain are all electrically operated. The safety curtain, the largest in this hemisphere, is of steel and asbestos and weighs seventeen tons including its balance weights. It is controlled from the stage, the manager's office and the projection box.

There are no footlights, the stage being flooded by powerful lights in the auditorium. The screen is of the magnoscope type, which can be opened out to greater size for spectacular scenes. The normal size upon which the picture is shown is about nineteen feet high by twenty-eight feet wide. This screen is the first in the country to be made so that it can be "flown" like an ordinary piece of scenery.

The sound horn behind the screen can be moved to the wings when all available space is required for a stage presentation.

The dressing rooms are well fitted and centrally heated and conveniently arranged for access from the stage.

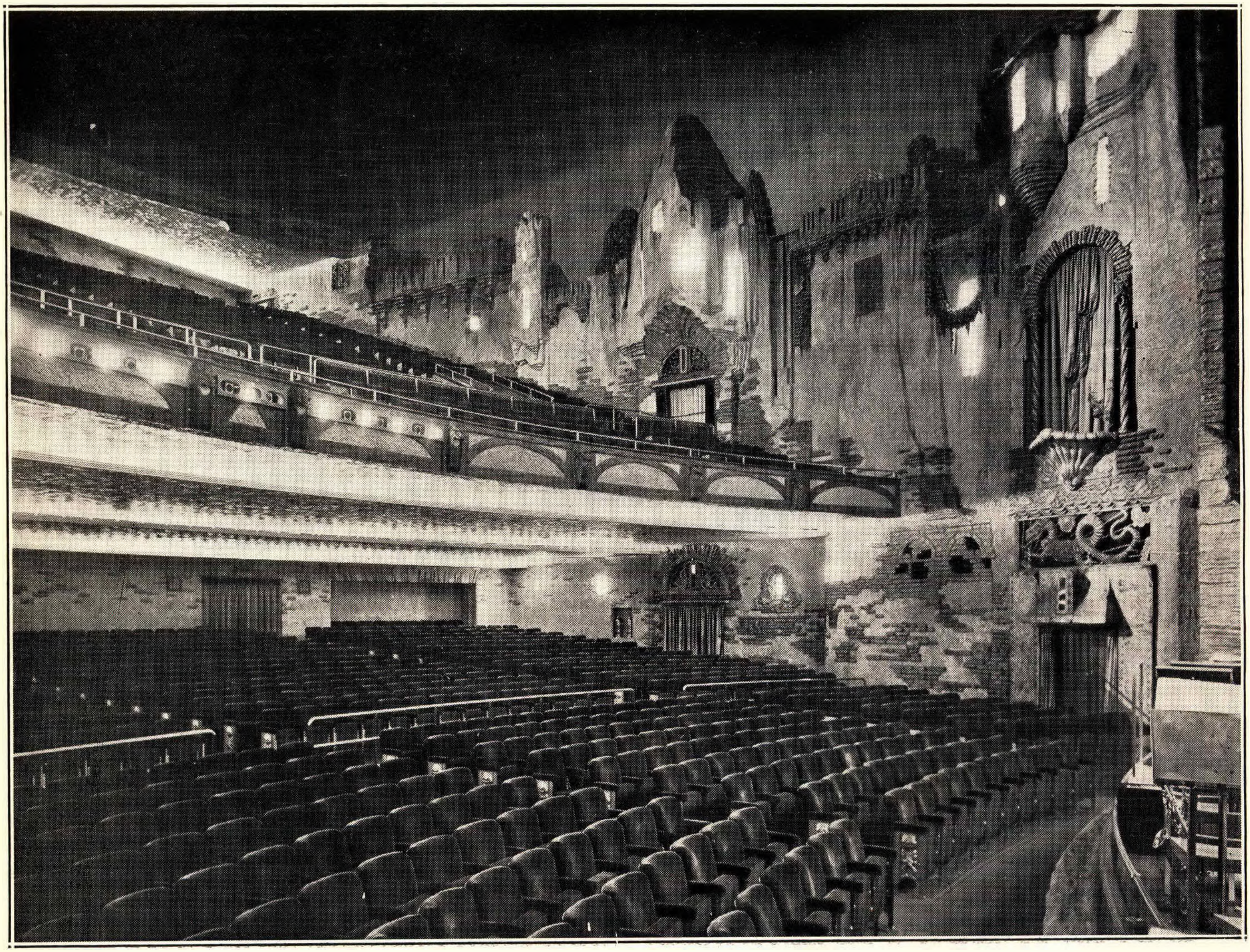
The main roof of the auditorium is constructed of heavy steel trusses covered by a concrete slab on which are laid the heat insulating and waterproofing materials. The atomspheric sky and projection box are suspended from the roof girders, the heaviest of which weighs twenty-five tons.

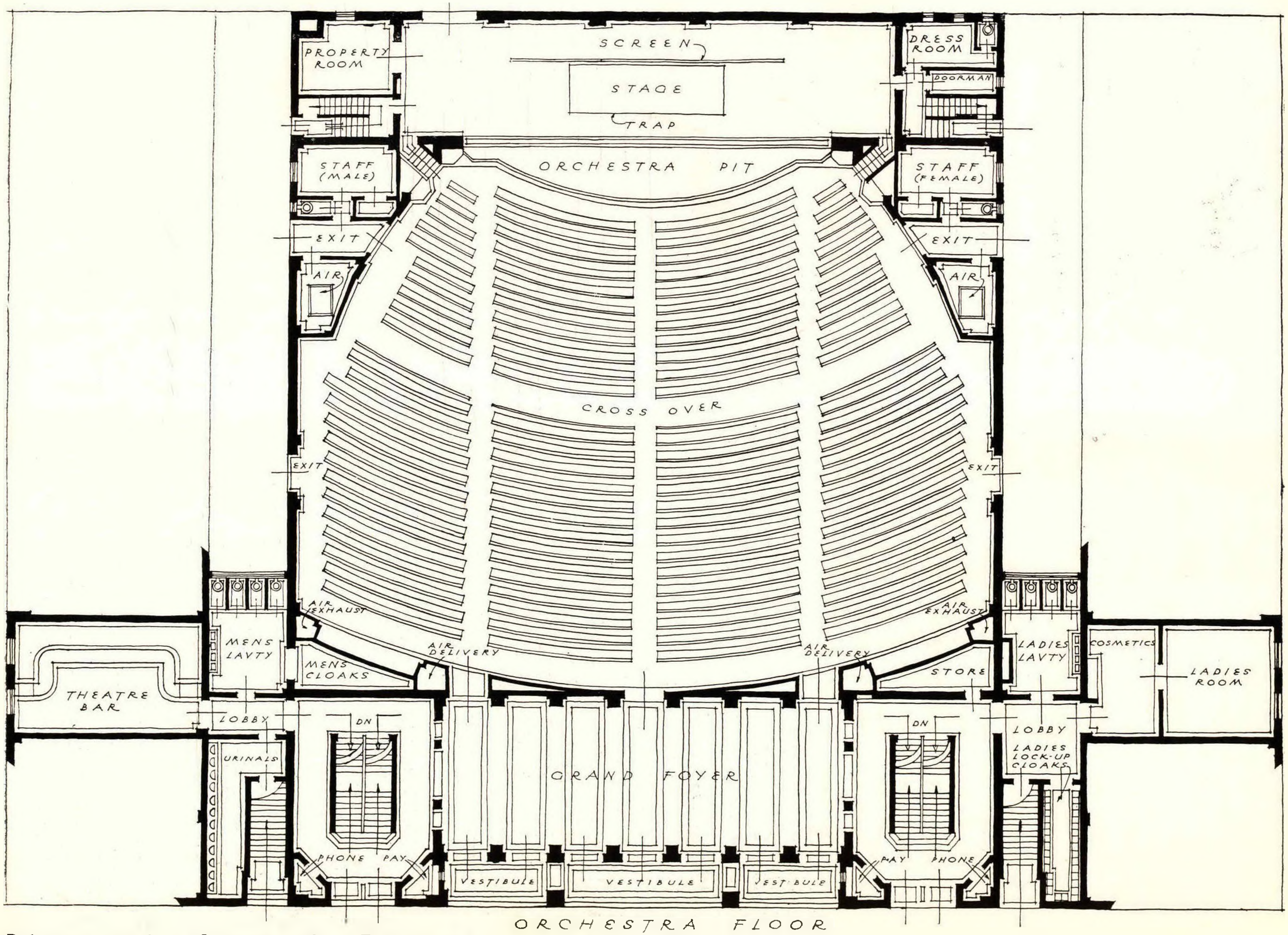
The electrical equipment of the theatre is capable of using as much current as the whole town of Krugersdorp. There are one hundred and twenty-five miles of electric cable laid in two hundred thousand feet of tubing. The whole installation was planned in Johannesburg, most of the equipment having been built overseas to the specification of South African engineers.

The entire installation is controlled from a vast main switch and fuse board running nearly the whole width of the auditorium and located in the void between the circle and the roof of the foyer. The lighting effects of the auditorium are controlled by a dimmer bank in the projection box which is twice as large as any in South Africa.

The lights themselves are concealed between the scenic decoration of the walls and between the recessed arches of the proscenium opening, and are so arranged that they are easily accessible. Three different colours are used and by combining these in various ways an unlimited number of colours can be obtained.

The Auditorium.






**Plan of Ground Floor.**

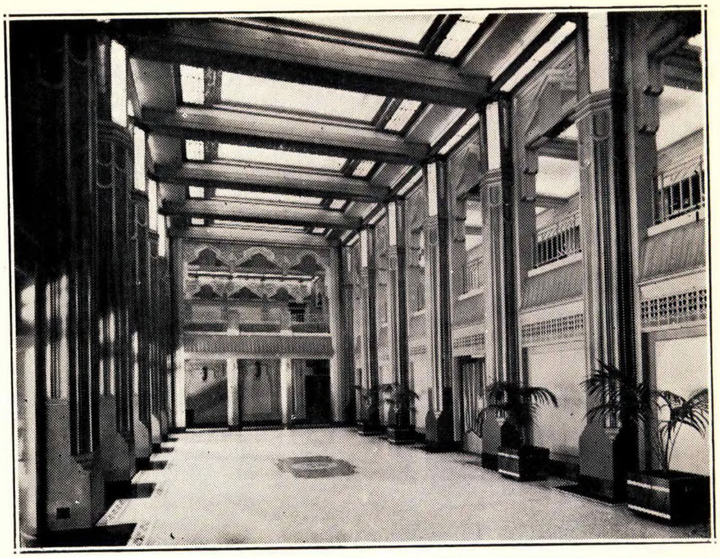
Direct current is desirable for motion picture projection and the current for the Colosseum projectors is converted from alternating to direct current by generators located in an engine room in the basement. This room also contains an emergency generator which automatically comes into action in the event of a failure of the electric supply. A great deal of time and research was devoted to the study of acoustics. From the point of view of power, the Colosseum sound installation is the largest in the world. Whereas the undistorted output of the average commercial sound installation is only 25 w. that of the Colosseum is 320 w.

The loud speaker behind the screen from which the sound is projected is the largest in the world, capable of a volume several times that of an orchestra of one hundred instruments.

A novel feature of the sound system is that, as a result of recent research, the sound system is enabled to be used to augment the orchestra, the volume of the latter being swelled by the loud speaker when greater contrast is required. The ceiling is made of one and a half inch cork in six inch slabs individually fixed. The sound system was designed and built by the staff of the African Consolidated Films Limited, in the company's laboratory at Killarney, over a period of two years. The acoustics of the theatre have been considered with unusually meticulous care, every echo surface being treated on a much more elaborate system than is usual.

The projection box can be reached only from outside the theatre and is completely fireproof. It is ventilated by three funnels overhead, through which heated and vitiated air is exhausted. It contains three film projectors of the most modern type. In it are placed the dimmer bank for the lighting, "talkie panels" from which the operators can control sound tone and volume and the arc light for flooding or spot-lighting the stage. A new type of special projector is used to throw slides on the screen.

The ventilation plant delivers one hundred thousand cubic feet of fresh, purified and tempered air every minute. By adjustment of the air pressure inside the theatre a slight



The Grand Foyer.

outward flow takes place whenever a door is opened instead of an inward flow of dust-laden air. At one side of the building is an air shaft through which the air is drawn. Thence it is passed through a bank of mist created by rows of nozzles from which water is sprayed, after which it passes to zig-zag eliminator plates where the free moisture and dirt are carried down into a storage tank by a film of water flowing continuously over the plates. At this stage the air is of correct humidity and is cooled or heated as required.

Four large boilers having a combined capacity of four million British thermal units heat the water which is used to warm the air. These boilers are controlled thermostatically. The two main delivery fans are each eleven feet high and the air is delivered into the auditorium at various points, the vitiated air being drawn out through openings under the seats in the circle.

The ceramic work on the main facade was executed by the Ceramic Studio, Olifantsfontein.

The Architect of the building is Mr. P. Rogers-Cooke, L.R.I.B.A., and the Associate Architect is Mr. H. Wolseley Spicer. The Architect was assisted in the construction generally by Mr. W. H. Mason. The Consulting Engineer was Mr. A. S. Joffe, and the Electrical Consulting Engineer Mr. H. A. Tinson.

## Proscenium Detail

The general Contractors were Messrs. Reid and Knuckey and the following were among the principal sub-contractors :—

Crittall Manufacturing Co., Ltd., Steel Windows and Collapsible Gates.

Hubert Davies & Co., Ltd., Electrical Installation, Transformers, etc.

Gilbert Hamer & Co., Ltd., and Union Construction Co., Ltd., Constructional Steelwork.

Hunt, Leuchars & Hepburn, Ltd., Roofing.

A. S. Joffe & Co., Design of Reinforcing Steel and Constructional Steel.

New Clare Smelting Works, Ltd., Reinforcing Steel Work.

S.A. General Electric Co., Ltd., Electric Fittings, Reflectors, etc.

Dowson & Dobson, Heating and Ventilation.

H. Benjamin, Plumbing Work,

Central Agencies & Import Co., Ltd., Marble Work.

F. Gwilliam, Bronze Signs, Balustrades and Grilles.

F. Sage & Co., Ltd., Metal Handrailing.

Shepherd & Barker, Ltd., Furniture.

T. F. Firth & Sons, Carpets.

Associated Engineers Co., Ltd., Sprinkler and Hydrant Installation and General Fire Protection.

Beard Ellis & Berlyn, Ltd., East London, Seating.

Pretoria Portland Cement Co., Ltd., Cement.

## The Ladies Cosmetic Room

In presenting this paper, the Author wishes to deal first with the types and general construction of earth dams and then with the selection and preparation of the soil in these embankments.

There are three main types of earth dams :—

(a) Those with impervious or relatively impervious cores and coarser upstream and downstream portions.

(b) A relatively impervious upstream portion and central core, and a coarser downstream portion.

(c) A relatively impervious homogeneous section throughout.

The hydraulic filled embankment used largely in the United States of America, is the main example of the first type. This method of filling involves excavating the soil in the borrowpits by directing streams of water from nozzles against the banks, and the resulting liquid mud is led away into main conduits, sloping to provide a sufficient carrying velocity, to the dykes along the outer upstream and downstream edges of the embankment under construction. From these edges carefully maintained slopes, to provide against gulleying and undesirable silting, carry the fluid to the centre of the embankment. These slopes are so designed that as the fluid passes down them the velocity drops, with the result that the bigger particles are deposited near the edges and the smaller carried to the centre—thus resulting in an accurately graded bank of the first type, from the coarsest particles at the outsides to a fine aggregate at the centre. In the centre a pool generally develops, and as would be expected, the velocity is suddenly dissipated on entry to this pool. Thus over the section under this pool an evenly graded core can be constructed. The width of this core can be suitably controlled by draining the pool by means of a suction pipe, which removes all liquid above a fixed level in the pool. Also, as with due evaporation and infiltration allowances, the amount of liquid entering equals the amount drained off, the fineness of the core can be controlled by the quantity flowing. In this way the time of settlement in the pool can be varied to almost any degree, and since the rate of settlement of a particle is directly proportional to the square of its diameter, the minimum size of the particles to remain in the core can be fixed, after due consideration of the fineness curve of the soil in use. This last is an extremely important consideration in Hydraulic filled dams, as where the size of particle in the core is too small to allow suitable escape for the water of saturation, high fluid pressures result. This was the case in many of the first hydraulic filled dams in the U.S.A. and slipping of the whole embankment under progress took place. For this reason also the toewalls of hydraulic filled dams have to have very special consideration as they take a great percentage of this pressure.

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The hydraulic filling process was first developed in the U.S.A. in placer mining districts. A great deal of trouble was caused by miners discharging the liquid mud from their workings into the streams and in time excessive silting up of the beds took place. In order to put this material to some useful purpose and also to conserve water for their workings, this process was very successfully developed. A standard example of this type is the Upper San Leandro Dam in the U.S.A. Crest length, six hundred and eighty-three feet ; crest width, seventy-five feet ; maximum height, two hundred and fifteen feet, stepped every forty feet with twenty feet berms ; yardage, one million two hundred thousand.

The next type under consideration is that with a relatively impervious upstream portion, a central core and coarse downstream portion. This type is fairly common and is

*A paper read before the Students section South African Institute of Engineers.*

usually filled and rolled. An excellent example is the dam under construction at Marico. There the earth is conveyed from the borrowpits to the embankment by means of lorries and scotchcarts. On the embankment is is spread out into loose layers of about nine inches thick, partly by hand, but mainly by a caterpillar tractor fitted with a bulldozer, whereby a layer of any required thickness can be obtained. The soil is then watered till of such a consistency that when firmly pressed in the hands water just appears. Consolidation is effected in this state by means of rollers. A special roller, a tamping sheepsfoot roller, is employed on this dam. This has feet each three inches by four inches, and protruding nine inches out from the drum and when rolling it supplies a consolidating pressure of about ninety pounds per square inch. Consolidation is also effected by the oxen passing over the embankment, the pressure resulting being much the same. Surfaces between the layers are left rough, thus supplying a good bond for the succeeding layer.

The corewall on this dam is constructed of concrete double reinforced with five-eighths of an inch bars pitched every four feet horizontally and every three feet vertically. The downstream side is vertical and upstream side battened one in fifty with a crest width of one foot. The soil near the corewall is well puddled by driving a team of oxen up and down its length. This is to ensure a good bond. Any junction between old and new embankments were similarly treated.

The soils used for upstream and downstream embankments vary considerably. In the upstream embankment a clayey loam containing a fair amount of lime is used. This is an alluvial soil from the banks of the river, and once dried yields a hard compact mass. In the downstream embankment a red sandy loam resulting from the decay of a red sandstone is used. This is very much more porous than the upstream soil and though tests indicated approximately the same water content at saturation, four times as much water was used on the downstream embankment as on the upstream embankment.

The Marico dam has a crest length of four thousand eight hundred feet ; a maximum height of eighty feet in the river section ; a crest width of ten feet ; and a total yardage of six hundred and fifty thousand.

In this type of dam the principle governing its choice is that the upstream portion must be as impervious as possible to keep the water out ; and the downstream as porous as safely allowable to let out whatever water has found its way in.

The third type of dam is that with a homogeneous section and is the type that is usually found on farms, where the farmer himself has constructed the dam. They are usually small and the soils used as a rule tend more towards the clayey loams.

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Protection of earth dams against erosion is essential as every case of failure has been due to this factor. There are three main items for consideration :—

(a) Erosion and warping of upstream slope.

(b) Erosion of downstream slope.

(c) Erosion by overtopping.

The first is safeguarded against by providing the upstream slope with a protective covering of concrete slabs, bitumen, broken rock. etc. At Marico the last mentioned is employed and consists of a covering of six inches of loose rock of about four inches maximum size on the soil slope, known as ballasting and on this ballasting a fifteen inch layer of flat stones. These are carefully laid so as to form a rubble masonry covering, without mortar. The layer of ballasting is essential, as without it the pitched stones become embeddel in the soil, and high pressures due to wave action in the joints, result. These cause considerable warping of the upstream slope. The ballasting, however, provides a means of escape for the water in the joints and the pressures are thus relieved.

Downstream slopes are similarly protected though more against gulleying from stormwater, and thus the protection is not provided with such great care. At Marico a layer of one foot of casing or loose rock up to six inch or eight inch size is spread over the downstream slope.

Erosion by overtopping is the most general cause of earthdam failure, and can only be really prevented by allowing ample freeboard against overtopping by waves; and ample spillway capacity against overtopping by sudden storms and cloudbursts. The freeboard that must be allowed for waves can be determined by consideration of their reach, etc.

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Having dealt briefly with types of earth dams and their construction the author now proposes to deal more with the materials of construction and the soil mechanics pertaining thereto. There are two main considerations in the selection of a soil, i.e., permeability and consolidation. With permeability are bound up such qualities as porosity, hydraulic gradient, capillarity and finesse with regard to piping of embankment; with consolidation weight of embankment, shrinkage of soil when drying, settlement of the dam after construction, compressive strength of the embankment, etc. The greater part of the work on soil mechanics is due to the Americans especially to the professor and staff of the Soil Mechanics Department of the Mass. Institute of Technology.

Permeability of a soil involves the study of the percolation of water through it. D'Arcy's law states that the percolation per unit area is directly proportional to the hydraulic gradient.

i.e. $Q = ki\,At.$

where $k$ = coeff. of permeability

$i$ = hydraulic gradient

$= \dfrac{\text{loss of head}}{\text{length of path.}}$

$= \dfrac{dh}{dl}$ (at any point.

Just to what extent the values of "k" for a soil should affect the choice of that soil, and the determination of the hydraulic gradient in the bank itself, is at the moment not very clear; but it does not require a great deal of consideration to establish the fact that the percolation and the time of saturation or hydraulic gradient in the dam must bear directly on the value of "k" for the soil in use.

Slichter has also derived a formula for the flow of water through soil and sands from

$$Q = \frac{KHA}{L}$$

where

$Q$ = quantity flowing instantaneously.
$K$ = Slichter's const. a function of effective soil diameter and the porosity.
$A$ = cross-sectional area of flow.
$L$ = length of path of flow. $H$ = Head.

The flow of the water under an earth dam is assumed and shown mathematically to follow confocal ellipses. Corewalls and puddle walls being relatively impervious, interfere with the lines of flow displacing or interfering with the ellipses and thus giving rise to longer paths and increased frictional resistance. (See diagram No. 1.)

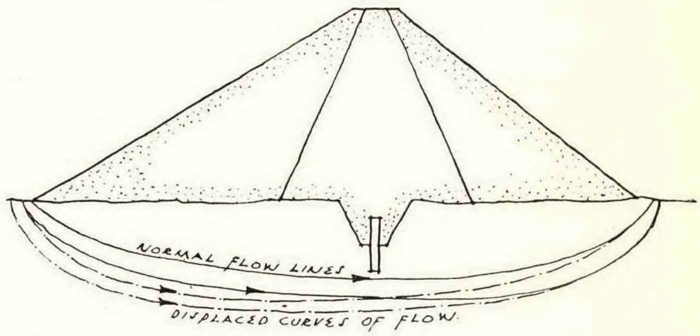



**Diagram No. 1. Percolation under earth dam**

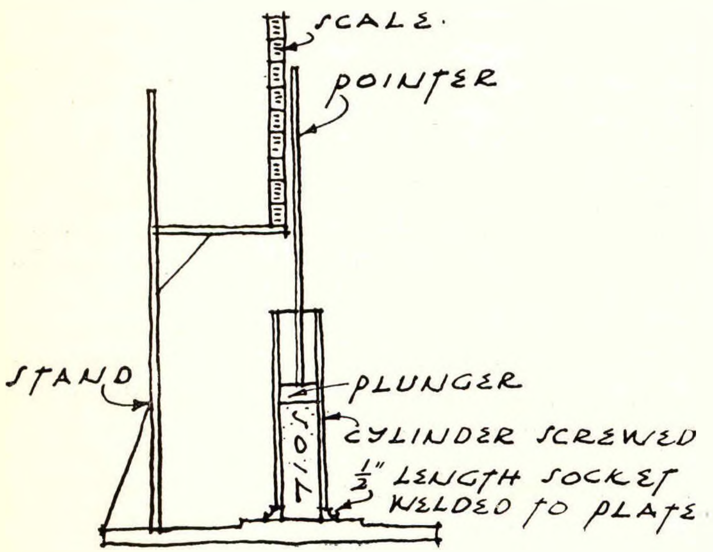
The next consideration in the choice of a soil is the proper consolidation of the bank. By consolidation is meant the process of compacting the loose earth on the embankment and is the ratio of final volume to initial volume.

Apart from the all round suitability of the soil there is always a certain amount of uncertainty as to the behaviour of the final consolidated mass with reference to its density, porosity and the precise degree of moistening necessary for optimum consolidation.

It was the with this final object in view that the author carried out a series of experiments on the Marico Bosveld Irrigation Scheme. The object in view was the determination of a water content other than saturation, (as defined by that water content so that soil leaves moisture on hands when firmly pressed between them) which would give as low a figure for consolidation.

The apparatus used consisted mainly of a loose plunger in a smooth one foot length of three inch piping which was screwed into part of a socket welded to a flat plate, thus permitting the pipe to come apart from the apparatus. Measurements of volumes were made by readings on a scale, by a rod fixed to a plunger. Pressure was applied by a lever with a mechanical advantage of three to one, the weight being applied to the end of the lever by means of a stirrup. For the tamping tests the lever and wooden plunger were removed, and the plunger then lifted and let fall a fixed distance a fixed number of times, on to the sample. (See diagrams Nos. 2 and 3.)

After putting the soil in the tube, this was shaken laterally till the surface was even. This was not always accomplished especially when soil was very wet and had coagulated, thus any further unevenness was removed by turning the plunger. That shaking, has varied results depending on the water content is clearly exemplified in the measurement of the density of sand in a cubic foot box. Shaking appears to remove a lot of the air entrapped between the particles, leaving these in a closer and more stable condition.




Water was applied to the sample by means of a graduated syringe which was the most accurate measuring instrument obtainable on the works. The soil was well mixed with the water until of homogeneous colour before putting it in the apparatus. This mixing, which had to be fairly thorough involved a

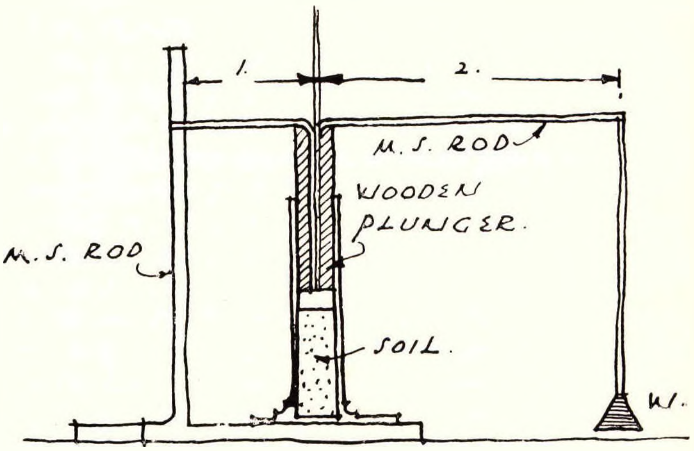



Diagram No. 3.

Pressure Consolidation

fair amount of puddling of the soil and it is to be wondered whether this did not increase its binding and consolidating qualities. However, all samples were similarly treated and tests can be safely assumed comparative— and slightly better figures for the various qualities to be expected.

Measurements were limited to the nearest sixteenth of an inch on scale readings, quarter ounce in weights, and quarter cubic inch in water volumes.

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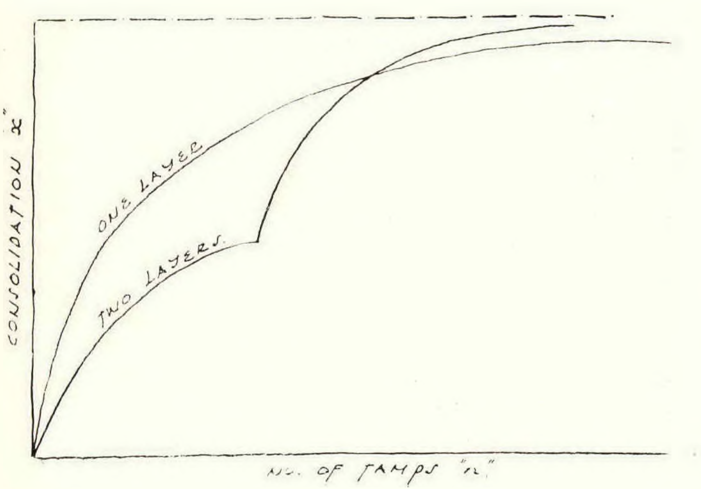
The first experiments were carried out with the same sample for the whole test, but it was found that losses in weight due to evaporation and losses of the sample itself occurred. To eliminate this the following method was used ; as soon as the sample could be pressed out of the pipe and remain whole the briquette thus made was left to dry and a new sample taken. The required amount of water was then added to this sample. This gave more exact results over the critical region and also provided an excellent way to test the strength of the soil ; the briquette being broken in the same apparatus with the pipe and its stand removed. A feature of the apparatus was that point loading could be avoided to a fair degree, by manipulating the plunger till its surface was square on the briquette surface. Compressive pressure was applied by means of lever, wooden block and iron plunger—the weight being supplied by a bag suspended from the edge of the lever, and which was filled gradually with sand till the briquette broke. The exact compressive breaking stress was then calculated.

Fracture was exactly the same as appears in the breaking of concrete blocks, i.e., shear laminating of the walls and crushing of the central cones. In the drying of the briquettes care was taken to get slow drying by covering them with damp cloths and even in very clayey soils no drying cracks appeared. At first tamping was the only method employed, but this later gave way to the pressure method, which was thought more nearly to approximate to the conditions set up under tamping by the sheepsfoot roller on the embankment. In this the pressure is gradually applied to a maximum and then gradually removed by the circular motion of the feet.

Preliminary tests were carried out with the tamping apparatus to determine both the best length and sufficient number of strokes. Two methods were tried.

Diagram No. 4.
Preliminary Tamping tests




(a) Packing the whole sample into the tube and then consolidating. Consolidation was read for different number of tamps, using both three inch and four inch sets of strokes. The results are shown in curves (No. 4) where the amount of shrinkage is plotted against number of tamps. As these latter increase the former seem to approach more nearly an asymtote which is evidently the maximum possible shrinkage.

The shrinkage increases as the water content to a maximum end, thence returns to zero at wet saturation as nearly as could be determined on this apparatus.

(b) The second method was to consolidate in two layers of approximately the same thickness. Similar readings were taken and the curves were made up of two similar curves joined by a cusp at the point where the second layer was placed.

The consolidation was slightly better in the latter case, as would be expected, but the slightly better results obtained did not justify the extra labour and trouble involved. Hence the following standard was decided upon :

Sample = 2 oz. weight (approx. $3\frac{1}{2}$ inch depth in tube).

Subjected to 30, 3 inch tamps of iron plunger.

Experimental data :—Weight of plunger = 2.39 lbs. to 0.34 lbs. per square inch.

On striking, Momentum of plunger = 9.56 feet lb. units of momentum.

Total work expended over 30 tamps = 17.9 feet lbs.

No preliminary pressure tests were made but the mark directly aimed at was that set by the sheepsfoot roller on the bank, i.e., a pressure of eighty-three point three pounds per square inch. This meant that in the apparatus used a weight of one hundred and ninety-six pounds would be required on the end of the lever. Since then, however, another factor has arisen showing that when saturation is reached, around the critical water content the soil becomes spongy and after the pressure has been removed, expands quite appreciably. This makes the elasticity of the walls once more an important factor and it is probable that the pressure employed corresponds more nearly to the practical case, especially in the critical region where this effect is more marked, than if the theoretical pressure were to have been employed.

The standards adopted have been described but will bear repetition :—

Tamping: 20 oz. sample, subject to 30, 3 inch tamps.

Pressure: 32 oz. sample, subject to pressure of 65.3 lbs. per square inch.

In the results three distinct volumes appear :—

(1) Loose volumes: measured with only the weight of the plunger on the soil under the conditions described.

(2) Pressure volumes: measured with weight of iron plunger, wooden plunger and force entered due to unbalanced moment of lever bar, stirrup, etc., amounting to a pressure of 2.66 lbs., per square inch. These volumes measured only in pressure tests.

(3) Consolidated volumes : measured after sample has been subjected to its standard test.

Densities for these various volumes were worked out, taking into consideration the water added mainly for the practical use of the tables.

Tables were drawn up with all the already mentioned quantities, together with consolidations referred to saturated and borrowpit conditions of the soil; bulking referred to saturated state; ultimate compressive strength; gallons cubic yard stating the actual content of the sample in terms of its own volume—the water being measured from the beginning of the test and finally a column of remarks describing the physical changes taking place.

Consolidations and bulking were defined as follows :—

Consolidation reference to saturated state =

$$\frac{\text{Consolidated Volume}}{\text{Saturated Volume.}}$$

Consolidation reference to Borrowpit state =

$$\frac{\text{Consolidated Volume.}}{\text{Volume as received from B.P.}}$$

Bulking reference to saturated state =

$$\frac{\text{Bulked Volume (Pressure or Loose)}}{\text{Saturated Volume.}}$$

The saturated volume was chosen as a base for reference owing to the uncertainty that arose from choosing any other state such as the apparently dry or even the borrowpit state. It is essential when testing from day to day that a constant base shall be available for purposes of comparison and dried soils never showed this factor. In fact it is highly probable that they were still a considerable way up the bulking curve as is definitely the case with a B.P. sample which can never be expected to give the same base. In the saturated region the bulking curve tends to flatten very considerably, and thus the saturated volume is more or less constant, providing an excellent base for reference. Pressure bulking is a very standard test for bulking, but loose bulking corresponds more to actual case. The consolidation referred to borrowpit state is computed for reference purposes.

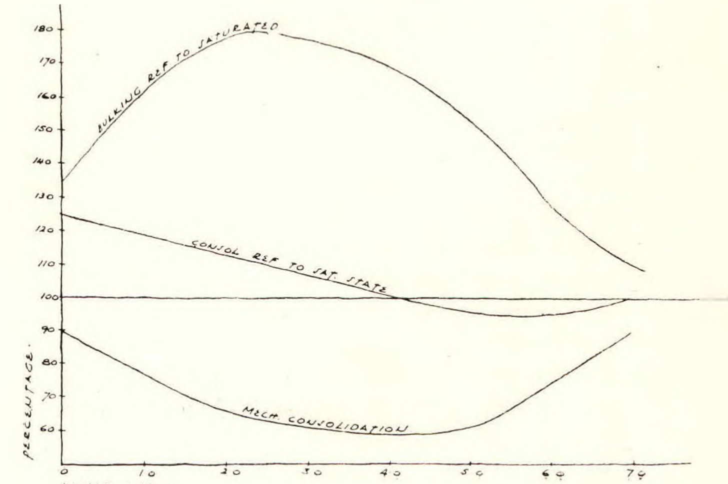
Curves were drawn initially for bulking referred to saturated state, consolidation referrred to saturated state and the mechanical consolidation for each test, and give some idea of the curves which are to be expected. Mechanical consolidation is a measure of the consolidating work on each sample and is really a ratio of the ordinates of bulking to consolidation curves. (See diagram No. 5.)

Tests were carried out on three soils :—

(a) A red sandy loam for the downstream embankment. This soil was very dry and pulverised in its borrowpit state and gave a lot of difficulty during handling, owing to excessive dust and its extreme mobility.

Diagram No. 5.

Preliminary Curves.



(b) A brown clayey loam from the East banks of the river. This soil was used for the upstream main embankment, and it contained a fair amount of lime ; contained a fair amount of ouklip pebbles.

(c) A brown yellowish soil from the West river bank, used mainly for the upstream sub-embankment ; a clayey loam containing a fair amount of ouklip pebbles.

It was hoped at the outset that a bulking curve similar to that for a sand would be obtained, and although certain curves bear a great resemblance, no soil could be made to follow the Inundation theory for sands. The curves most resembling this are those for the red sandy soil, but those for the more clayey soil, especially that of the brown clayey loam from the East bank borrowpits, quite definitely show that there is a minimum point quite near the beginning of the curve The most marked example is illustrated in curve No. 7. This is a very distressing fact as it leads to a complicated bulking curve and from consideration of bulking only the exact position of a soil cannot be determined. It may be further observed that the minimum points were quite definite and could in no way be avoided except by utter disregard. (See diagrams Nos. 6 and 7.)

Consolidation curves are fairly regular and coincide with the bulking curve at wet saturation (wet mud). There is a definite minimum before this point, however, as can be seen just before the dry saturated or pressure saturated point (pressure saturation denotes the point already described as saturation, i.e., soil under pressure yields moisture on plunger). This the author thinks may be put down to the spongy characteristics of the soil in this region, especially when dealing with clayey soils. It may be explained by saying that when the soil is not too wet the planes of friction are steeper and the sample retains a certain amount of the pressure applied and thus a smaller volume is given than when the soil is wetter and the particles more lubricated enabling the soil to throw off this pressure by expanding as is the case of that in the wet saturated region. Dr. Terzaki's work seems to be corroborated by this, as in his consolidation of soil work he obtained a pressure shrinkage curve showing that the soil consolidated steeply as pressure

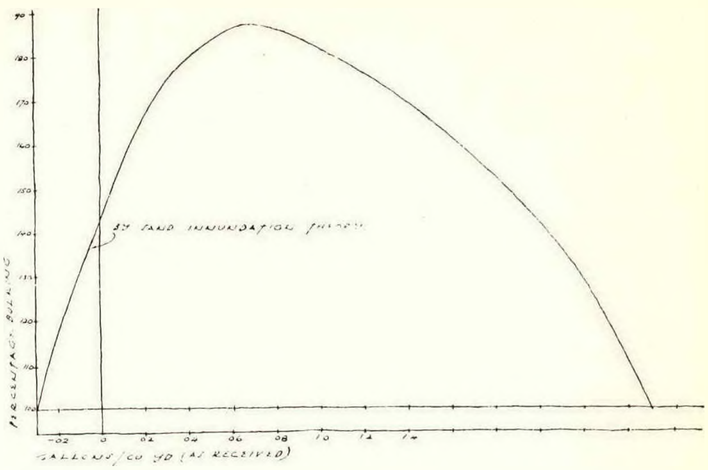
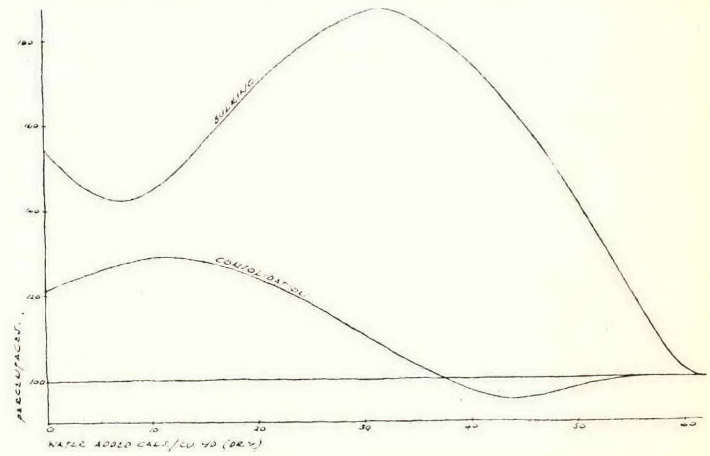


**Diagram No. 6.**

**Sand Bulking Curve.**

**Diagram No. 7.**

**Soil Curves for a clayey soil (from dry sample)**



was applied and then expanded as pressure was removed. Expansion was not as great as shrinkage thus leading to a further evidence of a certain amount of resilient energy remaining in the soil. Dr. Terzaki carried out consolidation tests with samples all submerged in water and using a very delicate piece of apparatus. With the apparatus used by the author the spongy effect was not noticeable with the soil under the same conditions, thus leading him further to believe his theory may be correct.

A further interesting thought suggests itself, based on the fact that when clay dries, a certain amount of drying shrinkage takes place, and the question asked is whether this phenomenon is not connected in some way to the dry shrinkage volume. The idea of resilient energy seems plausible in considering the wetting and drying out of an old embankment when no apparent expansion and contraction take place.

In the experiments, in attempting to link soils with the Inundation theory for sands, the soils were dried in two ways, viz.: in a pan over a strong fire and in a kitchen oven. Both drying periods were carried out over twelve hours. It was suspected that strong heating damaged the binding qualities of the soil and to investigate this samples were subjected to different degrees of heating and it was found from the results of briquette breaking stresses that this was definitely the case—and the more the sample was heated the lower the ultimate compressive strength.

The practical use of the curves can quite easily be seen. Consider a certain soil is in use on an embankment and a chart such as the one shown has been drawn for this particular soil, i.e., Bulking and consolidation (both with reference to saturated state), gallons, cubic yards (loose) of water in the sample, and density curves are drawn.

Then by taking any sample at any time and subjecting it to the standard tests; hence calculating both the loose and consolidated densities, the one to check the other, the position of the soil on the chart may be immediately determined. From this the bulked volume and hence the consolidation to be expected from the addition of any amount of water can be determined—that which is most important is the water which must be added for maximum consolidation.

E.g.—Consider the chart shown to be the one for the particular soil in question (See diagram No. 8).

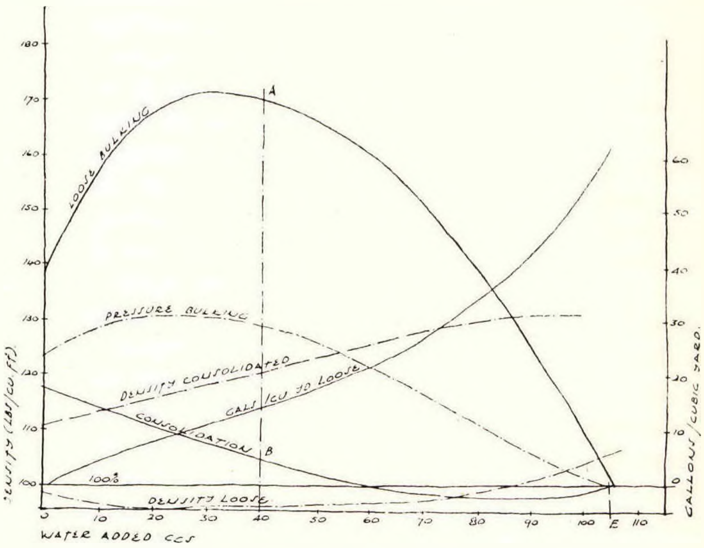



**Diagram No. 8.**

**Soil Chart.**

Let a sample be taken some day after and tested in apparatus in same condition as received from the borrowpit.

Let loose density thus obtained = 96.5 lbs per cubic foot.

Let consolidated density thus obtained = 121 lbs. per cubic foot.

Then working on the consolidated density and using the loose density as a check because of the fact that the latter curve is not so well defined, the line ABD is fixed on the chart.

Hence sample contains twenty-four gallons per cubic yard (considered from the standard dry state from which curves were computed).

Without addition of further water consolidation to be expected $= \frac{DB}{DA} = \frac{104.5}{170.0} = 61.2\%$

(This figure can be checked from mechanical consolidation obtained in the test.)

To obtained saturated consolidation ?

In original sample of 20 oz., 70 c.c.s. would have to be added, i.e., addition of

$$\frac{96.5 \times 27 \times 16 \times 70}{20 \qquad\qquad 4536}$$

$= 31.4$ gallons per cubic yard to the sample in question will give the required water content for maximum consolidation.

With this addition consolidation to be expected $= \frac{EC}{DA} = \frac{100}{170} = 58.8\%$

Various analyses of the soil from day to day thus take very little time and constitute an excellent record and check upon work and material.

The test may also be carried out by drying the sample to the same degree as that to which the original sample from which the charts were computed. For this purpose a standard drying apparatus would have to be employed so that the same degree of dryness would be obtained. A paramount feature of the apparatus would be that the colloidal structure of the soil should not be broken down. A suggestion for this is a standard steam oven in which standard quantities are dried over a standard time. In this type of drying apparatus it is unlikely that a great deal of water of combination would be given up, though up-to-date the author would not like to express any definite statement on this matter. The method itself is lengthy, and in consideration of this a complete test commencing from the borrowpit state might just as easily be carried out. This last would give a far more definite result.

It has been fairly well proved by the experiments of both Dr. Alexander du Toit and Dr. Terzaki that the nature of a soil may be completely changed, by changes in apparently physical conditions, such as breaking up the clods or chunks removed for testing, or changes in water content. Dr. Terzaki especially stresses these points and when testing a soil has a core bored out, and on removal from the bore encased in paraffin wax and removed to the laboratory. By removing portions of this wax but yet keeping the soil in exactly the same condition as when removed, the soil cylinder is used for the various tests.

Dr. du Toit, in a series of soil tests, found that the soil he was experimenting on completely changed in character when the water content changed from thirty per cent. by weight down to twenty per cent ; there being a vast increase in permeability and loss of cohesion. The point at which the change occurs he calls the critical point, and before reaching this the soil remains plastic under water, but after this point has been passed, disintegration immediately takes place and the soil will not regain its plastic qualities unless thoroughly worked up between the fingers.

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A consideration of this gives a reasonable explanation of the excellent binding qualities of puddled soil. The critical point as found by Dr. du Toit has also a great deal to do with the drying shrinkage of the sample, as after this water content is passed no more drying shrinkage occurs.

The insufficiency of standard data about soils and the complexity of the subject when really studied is evident. It would seem that the character of a soil depends entirely on its composition, physical and chemical, and previous history ; thus making the likelihood of finding exactly similar soils very remote. This means that for every soil a complete series of experiments has to be carried out before the nature and expected behaviour can be determined, and even then the behaviour depends on the physical treatment it receives.

In dealing with the density of an embankment with regard to overturning, another difficult problem arises in that when the soil is wet saturated it is equivalent to a submerged body and apparently loses weight equal to the weight of water displaced. However, earth sections are very large and the saturation line, even when allowing for vertical capillarity, is very little above the hydraulic gradient, thus giving a wedge of dry earth supplying a considerable resisting moment.

The materials to be expected in a soil are classified as :—(a) gravel ; (b) sand ; (c) clay.

The United States Agricultural Bureau of soils has sub-classified these into the following table. The final column gives the W.S. Tyler sieves passed or retained on.

| | | | | |
|---|---|---|---|---|
| 1 | Fine gravel | 2 to 1 | 16 | 9 |
| 2 | Coarse sand | 1 to 0.5 | 32 | 16 |
| 3 | Medium sand | 0.5 to 0.25 | 60 | 32 |
| 4 | Fine sand | 0.25 to 0.1 | 150 | 60 |
| 5 | Very fine sand | 0.1 to 0.05 | 200 | 150 |
| 6 | Silt | 0.05 to 0.005 | Hyradulic | |
| 7 | Clay | 0.005 to 0.0001 | grading | |

As will be seen after the fifth sub-classification which is retained on the smallest sieve possible, no further sieve analysis is possible and hydraulic grading has to be resorted to. This method is based on the principle that the rate at which a sphere sinks in a liquid is directly proportional to the square of its diameter.

Various lengthy ways of sedimentation have been devised but all were found unsatisfactory till G. Wagner brought forward a method of involving the density of the system. By various experimenters his method has been improved till to-day it consists of merely a cylinder in which the liquid and sample is disturbed until of homogeneous colour ; the specific gravity is then measured with time and the specific quality being measured with a common hydrometer, for exact tests photographic observations being taken. As the material settles the specific gravity drops and a plot of this quantity to a time basis gives graphically a mechanical analysis of the soil.

In using this method for the fineness curve of a sample, the same is analysed on sieves and a portion passing the two hundred sieve is hydraulically treated. The normal curve for the sieve anaylsis is drawn, and in the incompleted portion, a curve, geometrically similar to the hydraulic analysis specific gravity ; time curve, is constructed.

On the settlement of earth embankments after construction, the author will only deal very briefly. In practice a five per cent. allowance is made for settlement. This settlement takes place over a long period of time and when plotted against time the curve tends to approach a maximum value. The rate of settlement under unchanging conditions varies as a direct function, but this is never the case especially in South Africa where most dams are stormwater reservoirs. Over rainy periods there is a marked increase in the rate of settlement. A record of the settlement of various South African dams has been kept, and if studied carefully this subject constitutes a lengthy paper in itself.

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In conclusion, a brief resume of the paper and possibilities for the future. There is little doubt as to the future of earth dams. The economics of these show them to be vastly superior to any other type of construction as relief works—a problem which is very acute to-day. The majority of the labour is manual and unskilled. On Marico dam at one time there were over four hundred unskilled labourers on the pay sheets. Besides this, earth dams, when properly designed, built and maintained, will last indefinitely. They are little affected by extremes of temperature, such as frost, and are probably the safest type of dam in regions subject to earthquake shock. On the failure of earth dams, it may be safely said that every cause of failure has been due to erosion due to the neglect of some one of the above precautions, i.e., proper design, building and maintenance.

Concerning soil mechanics, the brevity and uncertainty of all the literature the author has read makes the great possibilities of research in this line all the more evident. There is no doubt that it involves many of the greatest unsolved problems in engineering, as besides dealing with the hydraulic aspects, there is the great problem of foundations and earth pressures as a definite portion of soil mechanics. In America, however, as before mentioned, the subject is receiving much attention, and it is to be hoped that conclusive literature on the subject will soon be available.

Professor W. G. Sutton, in discussing Mr. J. E. Jennings' paper, said :—

The theory of soil mechanics has only recently come to the fore, and the result of recent research on the subject gives every indication that it will have an important bearing upon such questions as the mechanism of earth pressure, the mode of transmissions of earth pressure in foundations, the factors which influence both the design and construction of roads, as also of dams of the type discussed this evening.

The subject of the design of earth dams is one on which there will be found to be a wide divergence of opinion, but I am glad to say I agree with most of what has been said tonight. The essential problem is that of providing, with materials reasonably near at hand, a structure which is both stable and reasonably watertight. The subject may be dealt with under two main headings :

(1) the dam proper ;
(2) foundation conditions.

I think it may be safely maintained that conditions pertaining to the dam itself give rise to the least degree of anxiety. As the dam is an artificial creation its main characteristics can be controlled by those responsible for its design and construction, and the necessary precautions taken to ensure that it is satisfactory.

Mr. Jennings has mentioned three types of earthen dams in general use. Physical conditions in South Africa are such that the first type, namely the hydraulic fill dam, is not likely to find much favour. The second type, which has been defined as consisting of a relatively impervious upstream portion, a central core wall and a relatively pervious portion down stream is a very suitable type for South African conditions, though the homogeneous relatively impervious structure referred to as type three is readily adaptable to conditions in this country.

In the design of earthen dams the first consideration is that the cross section of the dam shall be such that no slipping shall occur. This factor immediately settles the essential characteristics of the material that can be employed in construction. We know that sand when dry will stand at a fairly steep angle, likewise clay. If the sand is saturated with moisture its angle of repose decreases slightly, but saturated clay sloughs and probably will not stand at an angle of more than one in five to one in seven. Sand, however, is relatively pervious whereas clay is a reasonably watertight material. In practice a judicious mixture of these two constituents is likely to provide a satisfactory material and a determination of such a mixture would be the main factor to be considered in dealing with a dam of the third type.

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When a dam built of relatively impervious material is subjected to water pressure, water percolates slowly through it and, since the head used up in overcoming the frictional resistance to flow is moderately uniform, the line of saturation through the dam is roughly a straight line from the point at which the water surface meets the upstream face to approximately the downstream toe. If a system of drains is placed some distance upstream of the toe, the line of saturation or hydraulic gradient would end there and consequently be steeper. Now a steeper Hydraulic gradient would mean that the velocity of percolation through the dam would be greater than previously, and therefore the tendency to carry away small particles increased. On the other hand the whole mass downstream of the system of drains would be dry and in consequence its stability would be increased. In actual design a balance must be struck, because the measures taken to increase stability tend to bring about the conditions which cause piping in the embankment itself.

In the dam of the second type the upstream portion is made of material containing a high percentage of clay in order to render it reasonably watertight—at the same time it must contain a sufficient admixture of sand to render it stable when saturated with water. The downstream portion is made of material progressively more permeable as we proceed downstream, and adequate arrangements are made for drainage so that water passing with difficulty through the relatively impervious portion is easily carried away. Under these circumstances the hydraulic gradient is steep in the upstream portion of the embankment and flat in the pervious downstream portion and, as the drains are situated some distance upstream of the toe, a great mass of dry material is available in the downstream portion of the dam. The material situated in the upstream portion must be of such a nature that in spite of the somewhat steep hydraulic gradient the velocity of percolation through it must be less than that which will cause piping—that is to say, the gradual carrying away of the material of the embankment.

If necessary a core wall can be placed along the axis of the dam, thus materially decreasing the velocity of percolation and more or less dividing the dam into two portions—an upstream semi-saturated portion and a downstream near-dry portion. If reasonable care is taken in the selection and blending of material in order to produce adequate watertightness and this material is proper consolidated in the embankment, a hydraulic gradient of one in three or one in four will be quite safe. Under these circumstances a core wall is by no means an essential factor of the dam proper.

The second stage in the problem of the design and construction of eathen dams is that relating to conditions occurring in the foundation material under the base of the artificial embankment. If rock or an impermeable stratum exists at a reasonable distance below the base of the dam, it will be possible to carry a core wall down to this stratum and thus effectively provide a practically watertight diaphragm in the foundation material. As a result of this procedure the subsoil material upstream of the core wall will be practically saturated and that downstream practically dry. The chief factor then to be considered is that the saturated subsoil upstream shall be be able to support the portion of the embankment which rests upon it. If the embankment has been made of properly consolidated material it will not be necessary to take the core wall far into the body of the embankment itself.

When neither rock nor a reasonably impervious stratum exists within a reasonable distance below the base of the dam, the problem to be faced is a difficult one and considerable experience and judgment is required in the process of reaching a satisfactory solution. If an earthen dam is built upon such a site the conditions will be as follows :—

A large head of water will act upon the subsoil at the upstream toe and this will give rise to percolation of water under the dam. At the best this means a certain amount of leakage and at the worst, may mean that the velocity of percolating water may be sufficient to bring about the washing away of minute grains of subsoil material and thus produce piping and the ultimate failure of the dam. The rate of percolation in the material below the base of the the dam can be decreased if a cut-off wall is constructed from within the dam to a level some distance below the base. Such a cut-off wall will force the water to take a longer path and so decrease the velocity of percolation and therefore the danger of piping. The depth of such a cut-off wall will depend upon the type of material in the subsoil and and may be as great as one-half to three-quarters of the depth of water held up by the dam.

The last important factor to be considered is that relating to conditions which occur at the plane of contact between the base of the dam and its foundation. A plane of contact between two materials of different types is always a plane of weakness and every precaution should be taken to avoid an excessive rate of percolation there. The usual precautions normally consist of clearing away the upper portion of the original ground material and the provision of a series of shallow trenches parallel to the axis of the dam. The area of contact between the base of the embankment and its foundation is therefore not a plane and the path of percolation along the contact line is thereby increased. Further watertightness is secured by filling the trenches in the upstream portion of the dam with impervious material, which is thoroughly bonded with the material of which the embankment itself is constructed.

In concluding these brief remarks I wish to express my appreication of the very thorough manner in which the experimental work has been carried out. Research in the field of soil mechanics offers great scope for experimenters and will provide many opportunities for investigation which do not require the use of expensive apparatus. No student or engineer will ever regret the time spent upon gaining an insight into this subtle problem and I feel sure that we are all indebted to Mr. Jennings for the work he has done and for the information he has made available.

## British Industries Fair

The Department of Overseas Trade advises that this fair, which is to be held in London and Birmingham from the 19th February to the 2nd March, 1934, promises to be an even greater success than it has been during the past two years.

It has a Building and Decoration Section which should be of particular interest to Contractors and Merchants, etc.

Full particulars can be obtained from H.M. Trade Commissioner, 88, Fox Street, Johannesburg.

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An interesting message has been received by the Central Council from the Secretary for Union Education. The High Commissioner for South Africa in London was advised by the Architectural Association of London of the success of a former Durban student of architecture, Mr. O. Pryce Lewis. Mr. Pryce Lewis has been awarded the Bernard Webb Scholarship, which is of the value of £250. A letter conveying the High Commissioner's congratulations has already been sent to Mr. Pryce Lewis.

Mr. Lewis was a pupil of Messrs. Cowin, Powers & Ellis, Durban, from February, 1927, to November, 1930, and a student of the School of Art, Natal Technical College, where he won the Emma Smith Scholarship of the value of £500 in June, 1930.

He then proceeded to London and has done very well at the Architectural Association, having passed his final examination last year, with distinction for his Thesis.

Mr. Lewis is at present in Sir Henry Tanner's office in London.

## Provincial Home Rietfontein

The Provincial Administration, Transvaal, has decided to spend about £70,000, distributed over three years, in rebuilding the Chronic Sick Home at Rietfontein which in future will be known as the Provincial Home, Rietfontein.

It has been decided to promote an architectural competition for the buildings and the Administrator has appointed Mr. Robert Howden, F.R.I.B.A., as Assessor. Mr. Howden is preparing conditions of competition inviting Transvaal Architects to compete and it is expected that these conditions will be ready in February.

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The Seventh Ordinary Annual General Meeting of members of the Transvaal Provincial Institute will be held in the Council Chamber, Kelvin House, 100, Fox Street, Johannesburg, on Thursday the 15th March, 1934.

The meeting will be opened at 5.30 p.m. and after the appointment of Scrutineers to conduct the ballot will be adjourned until 8 p.m. for the continuance of the ordinary business.

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The Fifteenth Annual South African Academy Exhibition will be held in the Selborne Hall, Johannesburg, from Monday the 9th, until Saturday the 21st April, 1934.

Entry forms must be in the hands of the Honorary Secretary by the 17th March, 1934.

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The firm of Rhodes-Harrison and Fyvie, Architects and Surveyors of Bloemfontein, has established an office in Springs, and Mr. H. Fyvie has taken residence in Springs to attend to the affairs of the firm in that town.

Mr. W. Percik, A.R.I.B.A., recently arrived from England, has been registered as a member of the Transvaal Provincial Institute.

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Mr. I. H. Smail, recently of Capetown, has joined the firm of Messrs. Stucke & Harrison, Johannesburg.

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The Editor and Secretary of the S.A. Architectural Record extend to Members of the Institute, Advertisers, and Subscribers to the Journal their best wishes for a Prosperous Year 1934.

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In the November issue of the "S.A. Architectural Record" an article appeared on "Eighteenth Century Architecture in South Africa."

In this article Figure two, "Sketch of a Courtyard" and Figure five, "photograph showing roof construction" were prepared by Mr. H. H. McWilliams of Port Elizabeth.

The author regrets that these were not acknowledged at the time.

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## Central Council Notice.

As the result of representations made by the Central Council to the Hon. the Minister of Public Works, that some of the Union Government's major architectural projects should be entrusted to the profession by way of Competition, one Competition is proceeding. Another and bigger Competition is likely to be advised in the near future.

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## Chapter of S.A. Quantity Surveyors.

The Seventh Annual General Meeting of Members of the Chapter will be held on Saturday, March 10th, 1934, at 10.30 a.m., in the Committee Room, Master Builders' Hall, 147, Commissioner Street, Johannesburg.

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## Obituary.

Carl August Paul Gerntholtz, whose sudden death from enteric fever was announced last November after a few days' illness, was born in Pretoria in March, 1904. He resided the greater part of his life in Pretoria, being educated at the German Primary School and later at the Oost Eind High School where he matriculated in 1921. On leaving school he entered the office of Mr. J. R. Burg, of Pretoria, where he was employed until the time of his death in November, 1933. He attended the Architectural Classes then held at the Pretoria Technical College, and was registered as an Architect in 1926. The late Paul Gerntholtz was a keen sportsman and a well-known member of the Harlequin Hockey Club, which club he Captained for a number of years.

MORGENSTER SOMERSET WEST

Groot Constantia Homestead.

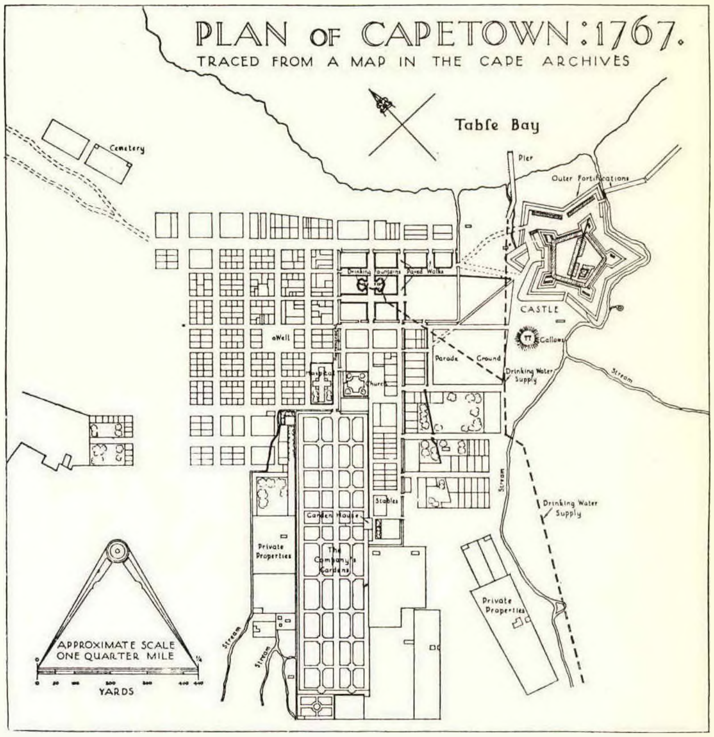
## EIGHTEENTH CENTURY ARCHITECTURE IN SOUTH AFRICA. By. G. E. Pearse. Batsford, London. 50/-

No one acquainted with the 18th century houses of the Cape has failed to fall under their spell. They embody something of that inexplicable universal truth which draws, holds, and delights everyone. Creed, taste, prejudice and even that bourgeois insensibility to the subtleties of lesser works disappears in the face of this powerful attraction.

To the multitude already acquainted, and to many more with sufficient imagination to give "dimensional life" to the flatness of mere photographic reproduction, Mrs. Trotter's "Old Colonial Houses of the Cape of Good Hope," published in 1900, and Dorothea Fairbridge's "Historic Houses of South Africa," published in 1922, have become a source of continual joy. As pioneer works, these more than fulfilled their purpose since they stimulated popular interest in what is, perhaps, one of the greatest heritages of this country.

With gathering interest, however, came the desire, at any rate amongst those more particularly concerned with the architectural welfare of the country, to probe more deeply into the mysteries of this wonderful achievement; deeper, that is, than the rather thin skin of photograph and word. It was felt that before the real meaning of its vitality could be appreciated, the bones, the joints, the sinews, in a word the complete working "anatomy" of the structures had to be understood.

Professor Pearse's publication, although it does not pretend to be exhaustive, does a great deal towards such enlightenment. No one keenly seeking that fundamental truth underlying all great artistic achievement, can fail to find clues to its explanation in this book.




Capetown in 1767.

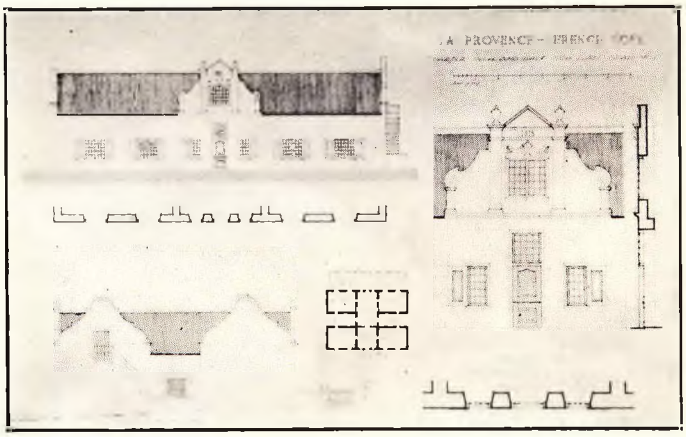
The introductory text is divided under four headings:—"Historical" deals with the early Dutch settlements, their governors, their vicissitudes and progressive development. One is brought into touch again, it cannot be too often, with the grand, almost legendary, old man of the early Cape, Simon van der Stel, and with his son Adriaan. We have again the story of the "Accusation" the sheer injustice of which must ever stand to the deep discredit of the Dutch East India Company and to Adriaan's fellow burghers who sponsored it. A series of plans of Capetown showing its development between seventeen hundred and eighteen hundred is especially interesting. One would like to have seen more of these.

"Architectural Character," shows how the buildings grew up from their "wattle and daub" beginnings, and explains the origin and meaning of such characteristic terms as "stoep," "voorhuis," "achterhuis," "dakkamer," "brandzolder," and others, terms which have become synonymous with old Cape work. It is interesting to notice how clearly the structural and decorative elements are due respectively to Dutch and Huguenot influences and how beautifully blended these influences became as a result of the various local conditions imposed upon them.

"Materials and Craftsmanship," goes on to deal with "stone" and the reasons why it never became a general building material; with "brick," the earliest and not altogether successful attempts to make it locally, and the importation of "klompjes" from Holland; with "lime burning" and the exhaustion of the Robben Island shell deposits; with "timber," its scarcity, and the continual search which finally led to the discovery and use of such characteristic woods as "stinkwood," "yellowwood," "beefwood" and others. Particularly interesting is the section dealing with the early flat roofs, their construction and proofing against rain. It will touch a tender spot in the memory of many designers of flat roofs to-day. External and internal "doors," "windows," "gables," "wallcupboards," "metalwork," and so on, are also described, each of them indicating some vague European origin but nevertheless standing out as exceptional, something distinctive, separate notes in a clear, harmonious cadence gathering the final creation to a triumphant close.

"The Architect and Craftsman," finally tells us something of the slaves, craftsmen, contractors, employers and others collectively responsible for the buildings with which the book deals. Known records reveal the names of only three men who had a hand in the work on the technical side: Thibault the architect, Anreith the master carver and sculptor, and Schutte the contractor. With perhaps the exception of Anreith, it appears to be difficult to assign any particular work, even among these, with any certainty. Thibault, like many of his great architectural predecessors, combined in himself numerous divergent capacities. We hear of him at different times as Architect, Military Engineer, and Surveyor, and may gather from his drawings, handed down to us through successive members of the Schutte family, that he was no mean artist in addition. It seems that he could not fail to have had more influence than anyone else on the building activities in and around the Cape Peninsula at the time of his sojourn between 1783 and 1815—a period during which most of the best work reached its ultimate perfection. When we see original designs attributed to him, however, such as those for the "Goede Hoop Lodge," "Newlands House," and "Papenboom," it is difficult to believe that he could have been directly associated with the modelling of "Groot Constantia" homestead, "Stellenberg," and others whose qualities represent the consummation of architectural endeavour of this time.

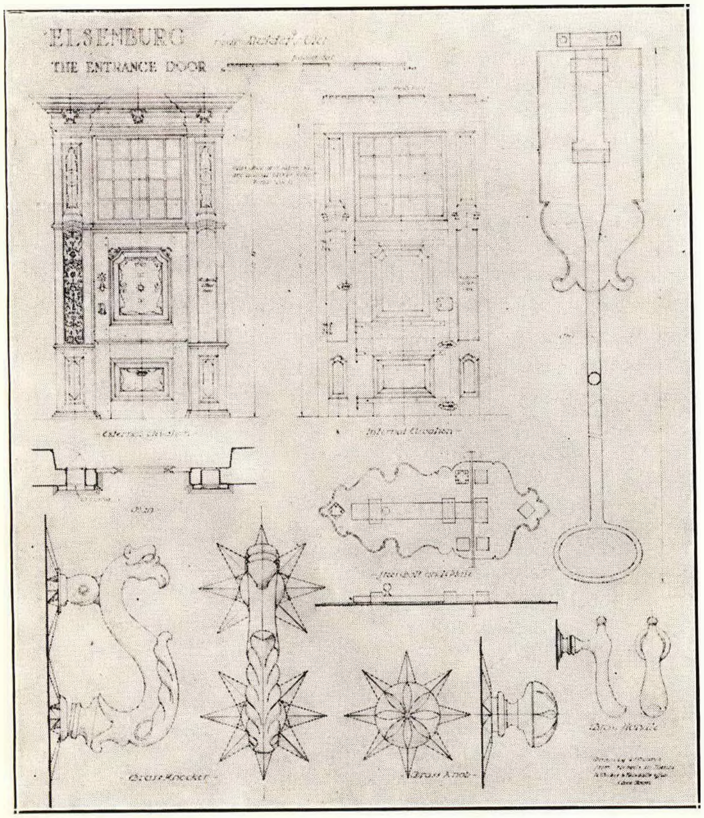
This lack of exact knowledge regarding their original designers accounts for much of the air of mystery and aloofness which is no inconsiderable part of the attraction exercised upon us by these old places. One cannot, however, help expressing a hope that in some hidden corner at the Cape the solution to it all will be found.



La Provence. Measured Drawing,

Then follows the main body of the book consisting of pictorial records, each with its complement of measured drawings and details, one hundred and thirteen plates in all, covering examples of the works described in the text. Photographs and drawings alike are reproduced in sepia tones on a matt surface pleasing to the eye, and are well arranged in a clear and simple way.

Professor Pearse explains in his foreword that this work is only the first of a series. We hope that the remainder of the series will follow with as little delay as possible, and that complete and comprehensive surveys will be made of such places as :—Neethlings Hof, Nektar, Vergenoegd, Klapmuts, Rheezicht, Klassenbosch, Schoongezicht, Lormarins, Bien Donne, Bosch-en-daal, Parelvallei, Kronendaal and Tokai. Special reference to the complete layout of each illustrating the function of the buildings as the "brain-cell" of the farm, would be indispensable.



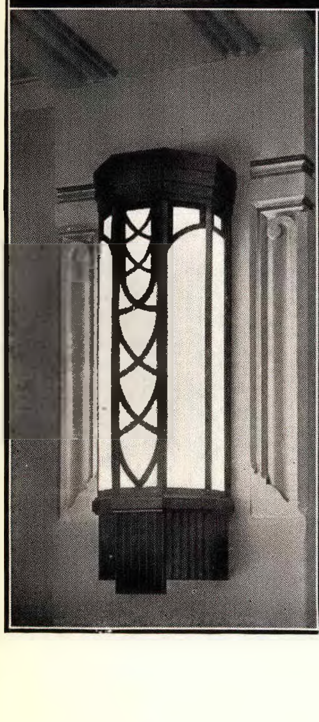

ELSENBERG. Details of Main Door.

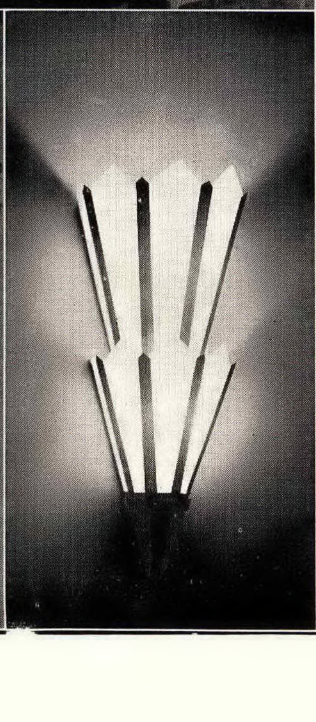
The value of this book and those that are to follow it, will lie in the sensibility with which keen students—and patrons—of architecture relate the indisputable spiritual qualities of the "living architectural whole" to the practical structural flesh and bone supporting it. The lesson these buildings teach is a great one. It strikes at the very fundamentals of the art. It is inseparably bound up with the essential honesty and truth of all those things which have become universally admired. A proper appreciation of them should do, not much, but everything towards the development of a correspondingly honest and truthful architecture in this present time and may help to destroy, once and for all, that rather common, atavistic misconception which attempts to clothe present day problems in the garb, so illsuited to its figure, of the old Cape pioneers.

Vital architectural truths have, for a century and more, been entombed in the "living" walls of Groot Constantia, Stellenberg, Alphen, Meerlust, Morgenster and a hundred others. We can have no greater hope than that Professor Pearse's book will release them once again, and we can pay him no greater compliment than to believe it will.

SPIER. Outbuildings.







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