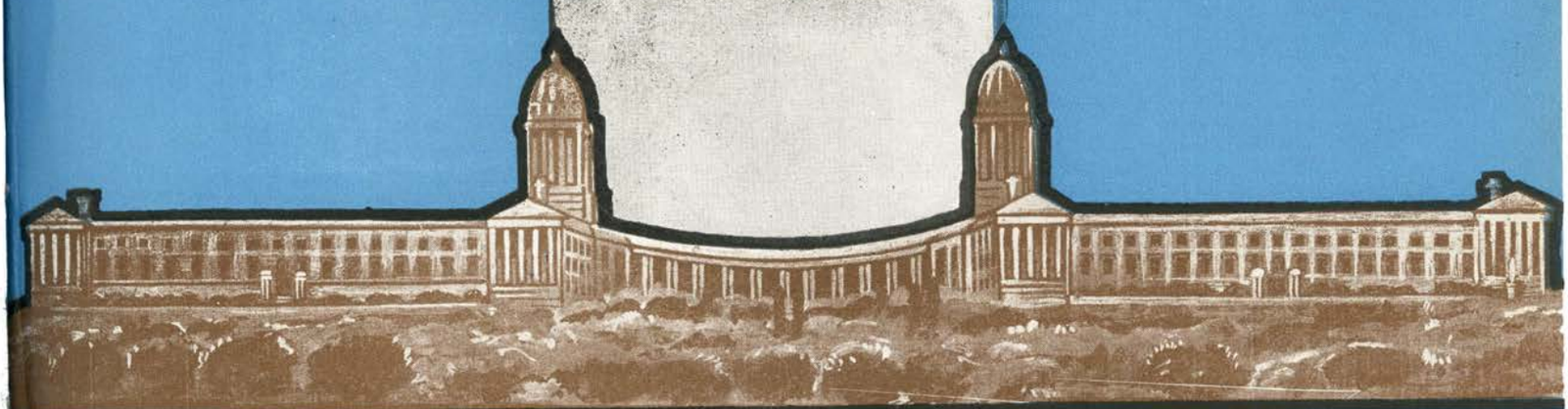
Vol. III. No. 14. DECEMBER :: 1939.

PUBLIC WORKS OF SOUTH AFRICA



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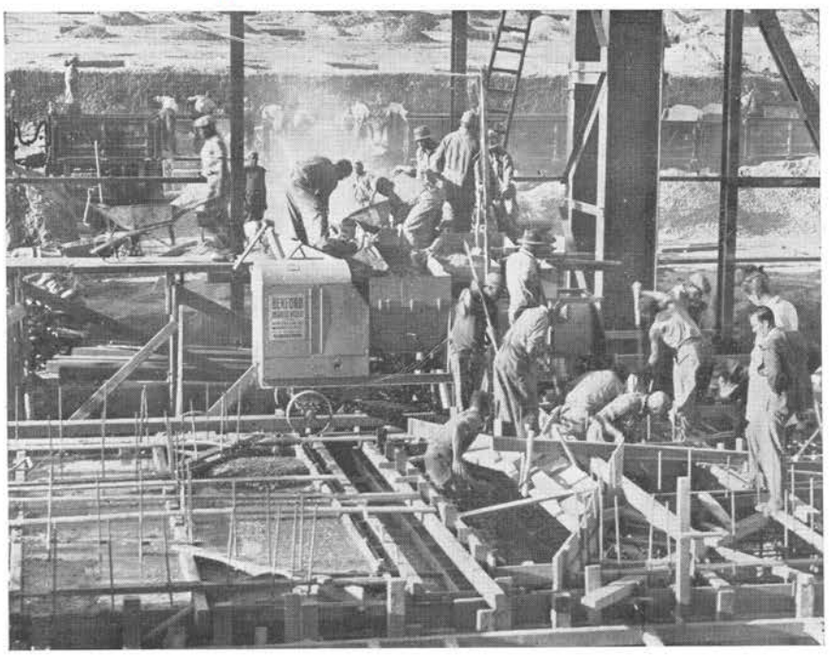

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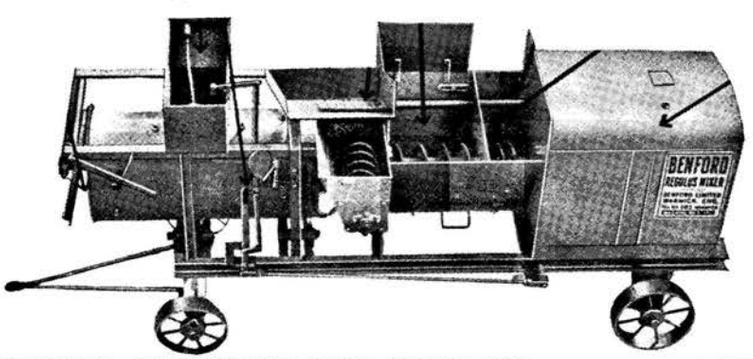

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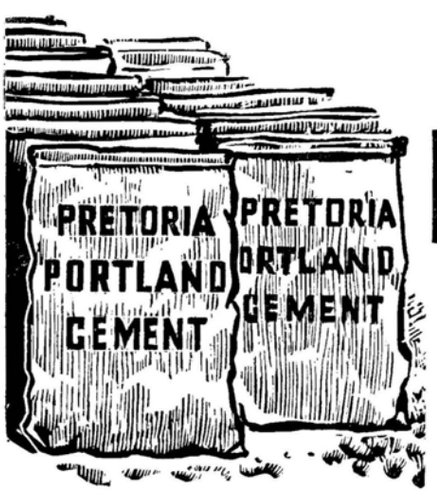

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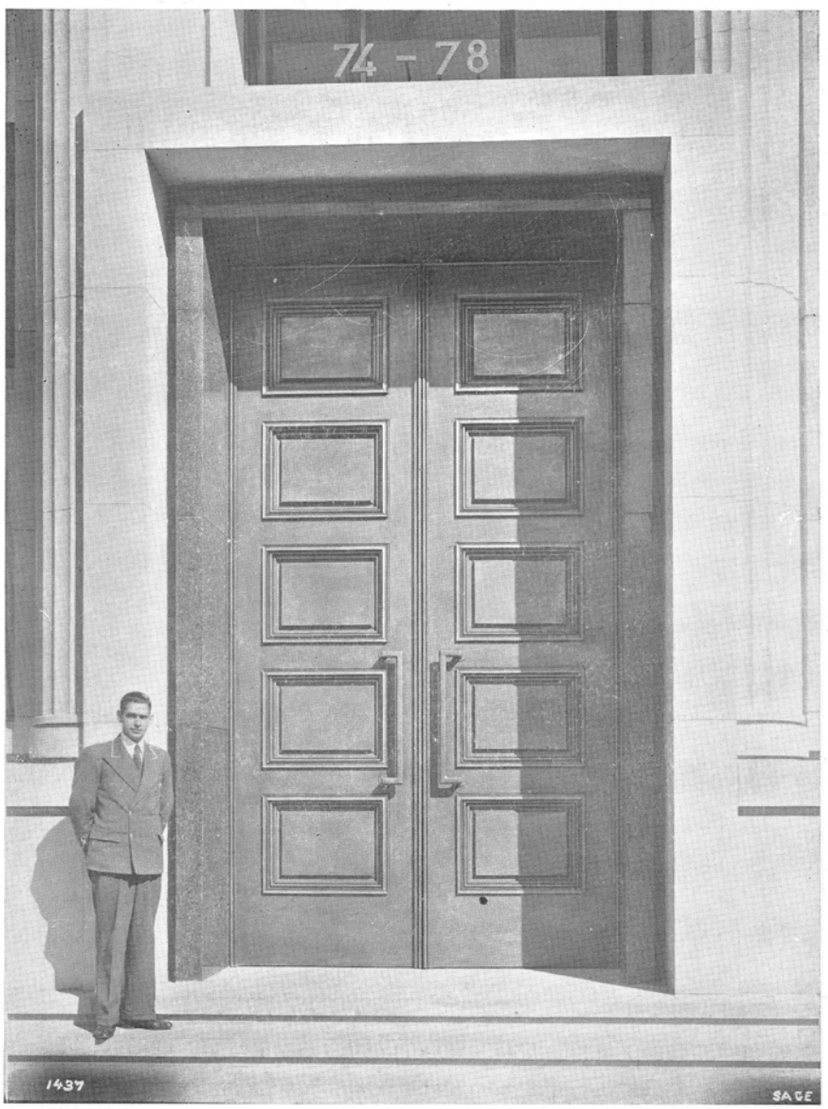

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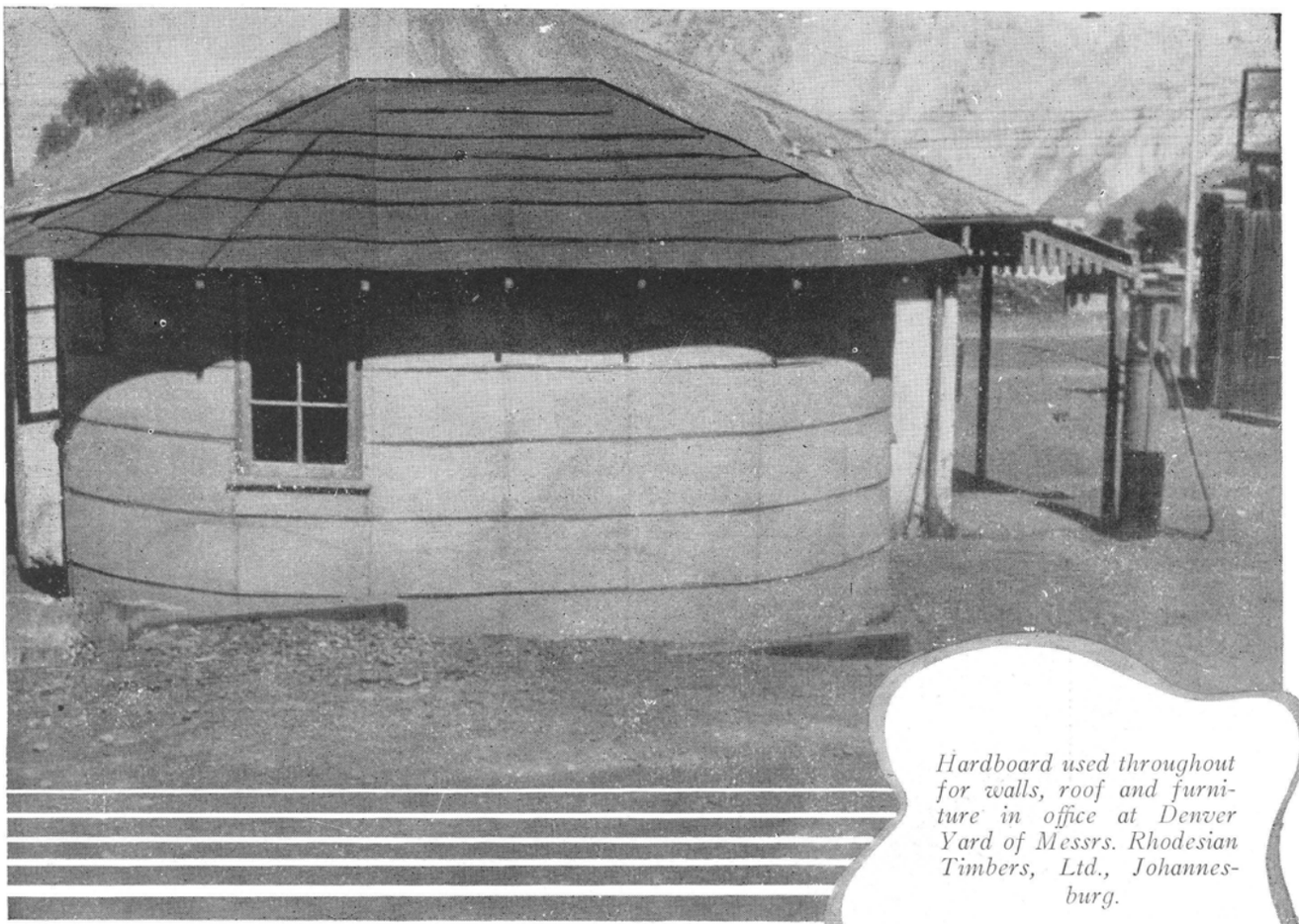

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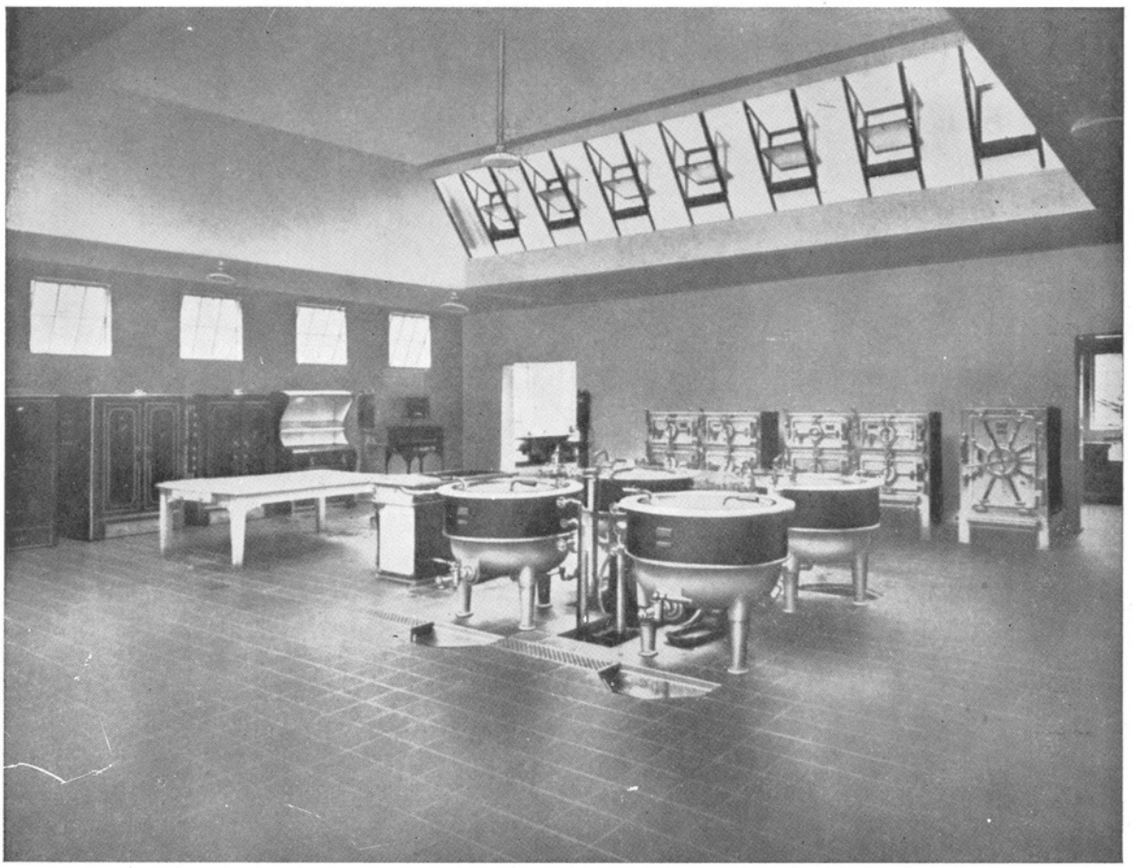

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van
Die Sekretaris en Personeel
van die
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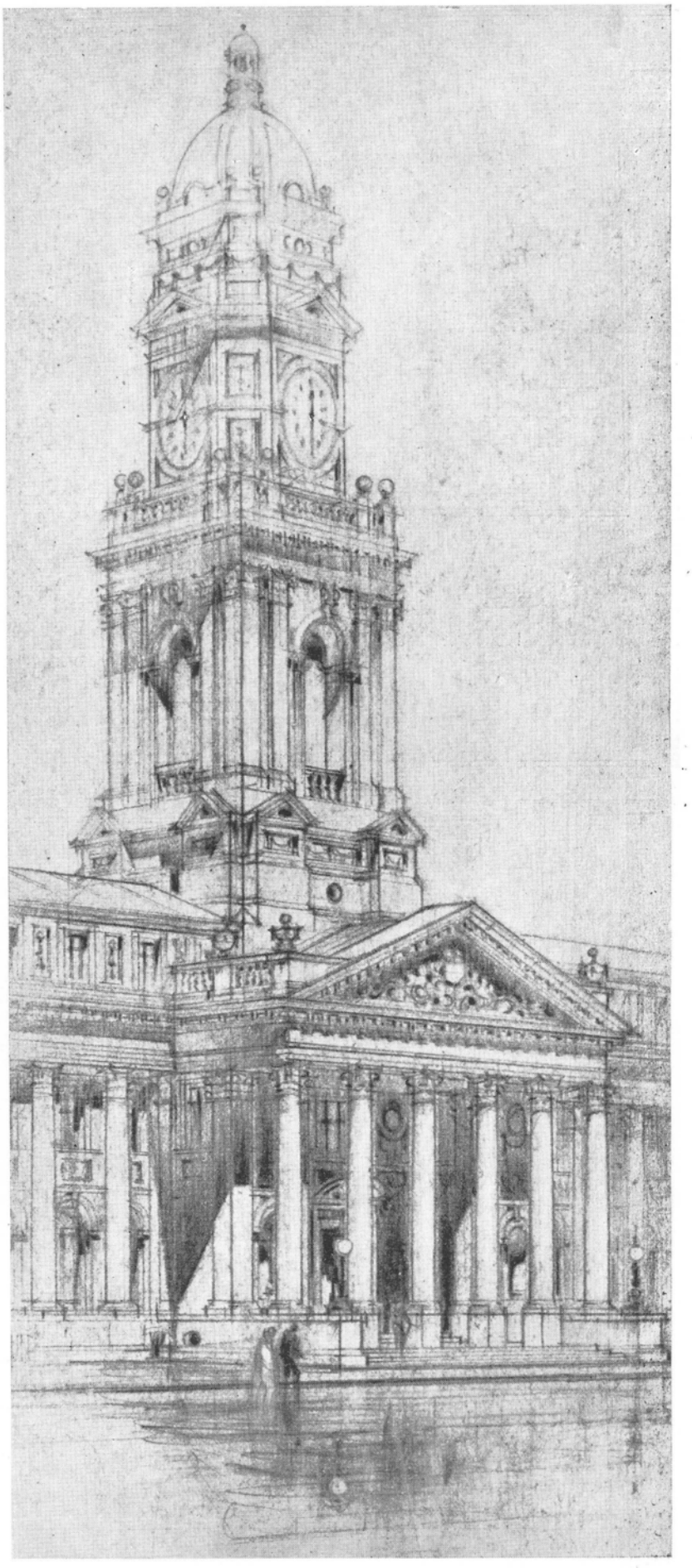

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DECEMBER,
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"PUBLIC WORKS OF SOUTH AFRICA," which is published monthly, is intended to keep the public up-to-date in regard to projects of the Public Works Departments of South Africa, Union, Provincial and Local Government, giving expression to the activities of each of these departments of service.

CONTENTS

INCLUDED in this issue is the Official Christmas Card of the PUBLIC WORKS DEPARTMENT OF THE UNION OF SOUTH AFRICA. To this we add our own Christmas Greetings and Best Wishes for the New Year, and take this opportunity to thank our readers for the kind co-operation which has enabled us during the past year to publish descriptive articles on so many fine buildings and projects.

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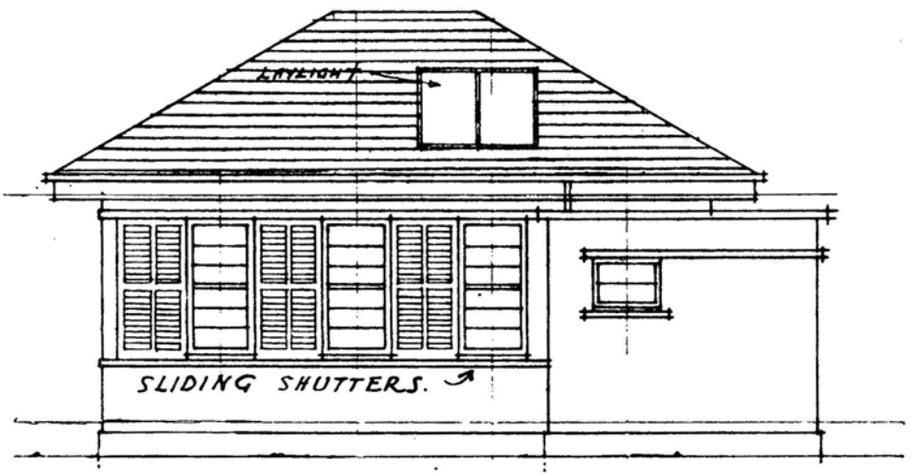

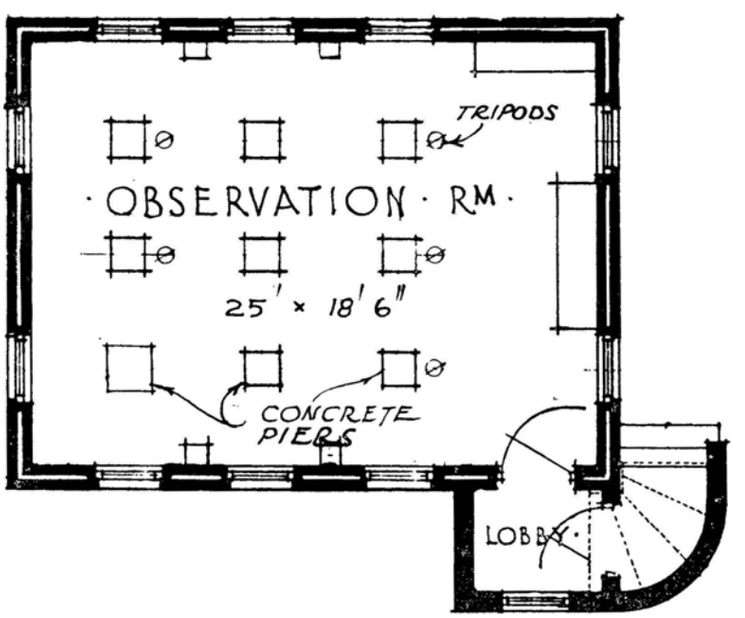

ABSOLUTE MAGNETIC OBSERVATORY :

Plan and Elevation

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History of . . .

MAGNETIC OBSERVATIONS IN SOUTH AFRICA

and . . .

Details of New Magnetic Observatory at Westcliffe - Hermanus

☆

This article was written from notes specially prepared for the purpose by DR. A. OGG, MAGNETIC SURVEY ADVISER, Magnetic Observatory, University of Cape Town, Cape Town.

DR. SPENCER JONES, the Astronomer Royal, of the Royal Observatory, Greenwich, when he was H.M. Astronomer at the Royal Observatory, Cape Town, in advocating the establishment of a magnetic observatory at Cape Town, remarked that the question was not whether the Union of South Africa could afford a magnetic observatory, but whether the Union could afford to be without one. Ever since the Magnetic House at the Royal Observatory, Cape Town, where fairly regular observations, under Sir Thomas Maclear were taken by detachments of the Royal Artillery over a period of seven years, was burned down in 1853, attempts have been made to establish an observatory on the lines of those in progressive countries. The organised magnetic surveys, such as carried out by Sir Carruthers Beattie and Professor J. T. Morrison, have suffered from the want of a magnetic observatory as a reference station. The demands for accurate magnetic data for navigation by sea and by air; for geophysical prospecting in developing the mineral resources of the country; for determining the magnetic changes that are taking place in the earth and in its atmosphere, necessary for many scientific purposes, have become more insistent within recent years.

Of the 75 magnetic observatories existing throughout the world, only 10 are situated in the Southern Hemisphere and these are badly distributed. In 1932, before the magnetic observatory at Cape Town was built, there was only one magnetic observatory on the African continent, at Helwan, near Cairo. There was not a single magnetic observatory on the African continent south of the equator.

Origin of the Magnetic Observatory at Cape Town: THE importance of securing increased knowledge of the physics of the earth through observations in polar regions has long been recognised. The isolated observations of explorers are of little scientific value, because their observations are not co-ordinated to observations at other stations in polar regions and are taken only over short periods. As it is impossible to maintain observatories in polar regions, organizations sponsored by over 30 countries took simultaneous observations at appointed stations over a period of one year from August, 1882, to August, 1883, and again after 50 years from August, 1932, to August, 1933. The International Commission, which organised the work for the Polar Year 1932 – 1933, requested the Governments in the Southern Hemisphere to help by taking simultaneous observations in their own countries. As there was no magnetic observatory in the Union of South Africa, Dr. A. Ogg, Professor of Physics, University of Cape Town, was invited by the International Commission to set up a temporary magnetic observatory at Cape Town. This was made possible by the loan of instruments by the International Commission, the Carnegie Institution, Washington, and the University of Cape Town. Financial assistance was also given by the Carnegie Corporation, New York, the Carnegie Institution, Washington, and the new Consolidated Goldfields, Ltd., Johannesburg.

The importance of the work carried out at Cape Town during the year 1932 – 1933 led the Commission, and afterwards the International Union of Geodesy and Geophysics, to recommend the establishment of a permanent magnetic observatory, near Cape Town. The Associated Scientific and Technical Societies of South Africa also approached the Government as to the necessity of an organised magnetic and gravimetric survey of the Union.

In April, 1934, the Government voted a grant in aid to carry on the observatory until it could be put on a permanent basis.

In April, 1937, a Magnetic Branch of the Trigonometrical Survey Office was formed, with Dr. A. Ogg as magnetic survey adviser, to take over the administration of the magnetic observatory and organize the magnetic survey of the Union.

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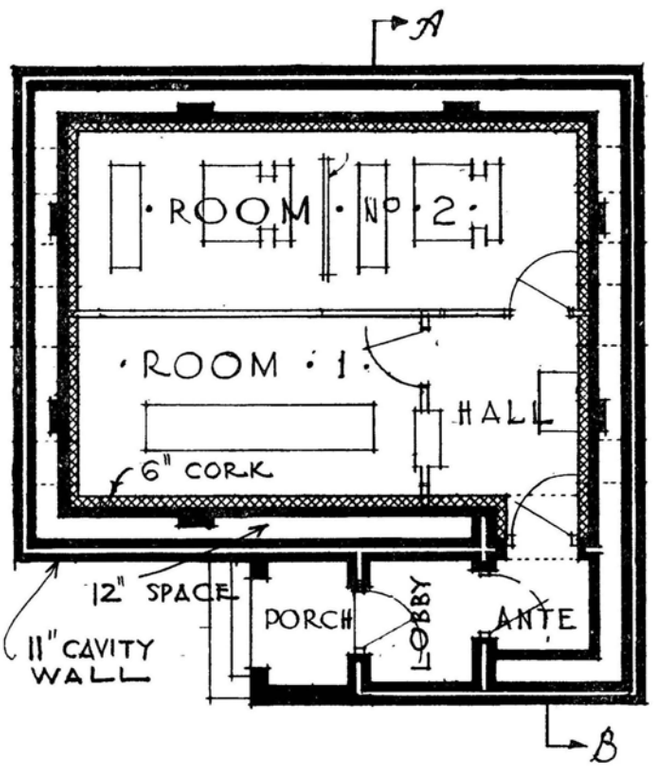
As the Magnetic Observatory at the University of Cape Town was formed on a temporary basis, it was necessary to consider the building of a new observatory. The site at Cape Town, which had of necessity to be chosen near the Physics Department, is quite unsuited for a permanent observatory because of the strong magnetic disturbances created by the electric railway traffic. The site at Hermanus was chosen after a magnetic survey of the locality was made and found satisfactory. The site is sufficiently removed from the electric railways to be free from the magnetic disturbances caused by them.

The alternating current supply of the town will not cause inconvenience in that respect, but will be of great help in the ordinary working of the observatory.

In highly industrialised countries it has been found necessary to remove the magnetic observatories to isolated localities, to set up electric plant for the routine work of the observatories, and to build residences. Although the nature of the work requires that some member of the staff must be on duty each day, it is not contemplated at present to build a residence at the observatory, but to provide a garage to facilitate motor transport to and from Hermanus.

Buildings: THE new Magnetic Observatory comprises four separate buildings, namely, an Absolute Magnetic Observatory, a Variometer House, an office and lavatory block, outbuildings and garage block. The siting of the Absolute Observatory and the Variometer House was decided in relation to the magnetic meridian, and to give uninterrupted views both for astronomical observations and of marking beacons. From an architectural point of view, the problem is an unusual one. As will be seen from the plans, the buildings are all very small and had to be suited in construction and material to the job. In the Absolute Magnetic Observatory and Variometer House iron had to be rigidly excluded from every part of the construction and of the fittings. Ordinary nails and screws could not be used. Concrete members had to be designed to avoid reinforcing rods. The specifications include the testing of all material comprising the masonry to ensure the exclusion of all magnetic material. In the office block, the masonry and roofing are non-magnetic, but the exclusion of iron is not required to be so rigid as in the other two buildings. All the buildings have been provided with a wood-shingle roof, the shingles being laid on boarding and fixed with copper nails. Flat roofs have been covered with copper laid on boarding. All gutters, waterpipes, duct work and electrical installation fittings are made of copper. Fittings to doors and windows are made of special brass.

Variometer House: THE most interesting of the buildings from the point of view of construction and materials is the Variometer House. In this building the sensitive photographically recording instruments, for giving the variations of magnetic intensity, are set up and are in continuous



VARIOMETER HOUSE——

Plan above and Section AB on opposite page

operation. Although these instruments are compensated for temperature variations, as far as possible, it is necessary to keep the rooms free from sudden variations of temperature and to keep them at a reasonably constant temperature. It will be seen from the reproduction of the section through this building that the walls are double, the outside wall being of cavity construction. A space of 12", which is continued right down to the foundations, separates the walls. The interior walls will have an inside lining of 6" of cork, and also the ceiling. On the walls the cork lining is to be laid over a layer of ½" insulite. The cork lining is to be plastered on the surface and painted black. The floor will be of wood-blocks laid on a 3" cork lining over a 3" concrete floor. The lower surface of the cork lining on the ceiling will be covered with boarding and a double ceiling formed by another layer of ½" insulite on the underside of the ceiling joists.

Windows, which would prove a weak link in temperature insulation, have been eliminated, because all observations in this building are made through photographic registration. Natural through ventilation is provided by brass vents in copper ducts.

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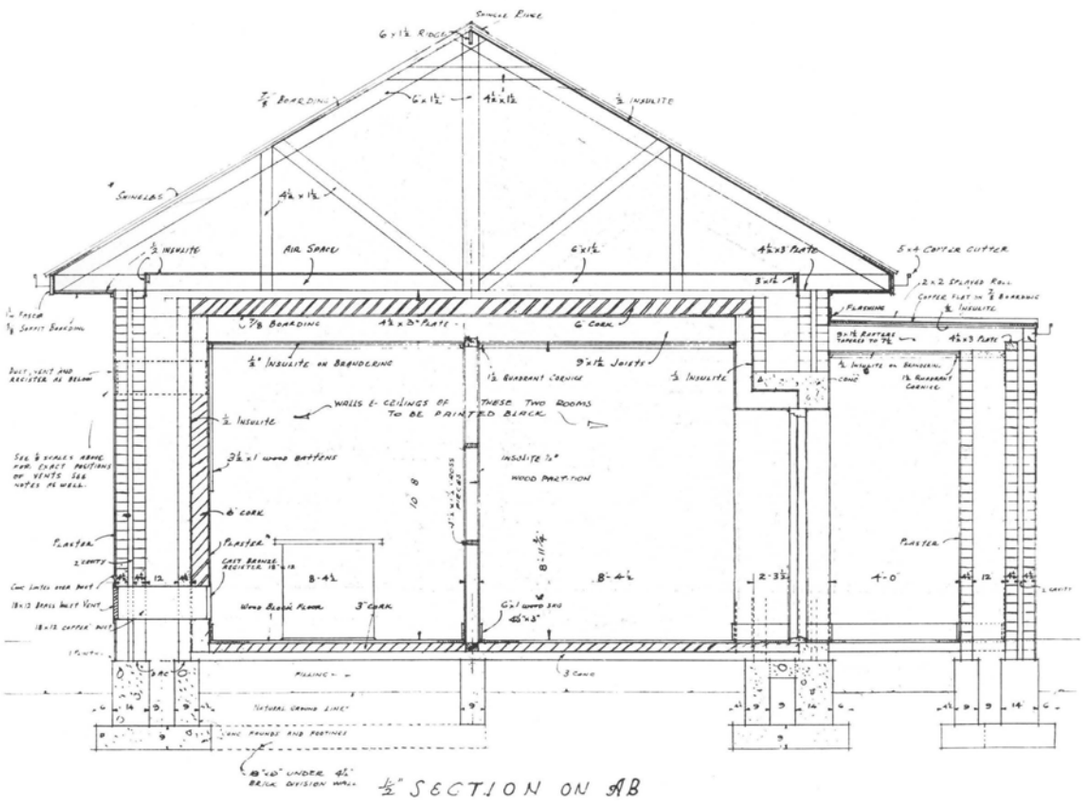

Reference to the plan will show that access to the instrument rooms is from a porch to a lobby, an ante-lobby and finally a hall, where the photographic records are removed from the recording drum and the drums reloaded. Each entrance has a separate door, ensuring that the instruments are protected from dust and from draughts when an observer enters to change the records or make some adjustment to the instruments. There are two rooms, separated by a wood partition covered with insulite, for the two different types of recording apparatus.

Special instrument tables point also to the accuracy of the construction. The marble tops are to be slotted and stepped to fit the instruments which will be installed.

All internal doors are to be of the flush type, designed specially for heat insulation.

Absolute Magnetic Observatory : THE Absolute Magnetic Observatory is a block of much simpler construction of non-magnetic material. It comprises a single room rectangular in plan with an entrance porch and lobby. The windows, which will be of wooden sliding-sash type, have sliding shutters, on account of the windiness of the region. The floor is to be of 3" concrete covered with wooden blocks, and the walls will be of cavity construction. The square section piers, some of which are vertically slotted, will be of a section and height suitable for the instruments to be placed on them for absolute measurements or for standardisation.

A double-glazed laylight has been specially designed in the roof for overhead lighting required for certain instruments.

Office Block and Outbuildings : THIS block contains two large offices, a typist's room, a record room, and a large laboratory connected by a "maze" to special photographic and enlarging rooms having light-proof shutters to the windows. The floors generally are of granolithic, except in the offices and lobby, where wood-blocks have been laid; and all the windows which are of the sliding-sash type, are fitted with sliding shutters. The laboratory windows have special dark blinds.

The Outbuilding Block consists of garages and Natives' quarters, and has been sited some distance away from the other blocks.

The fencing enclosing the site is to be non-magnetic, being constructed of wooden poles and rails and having teak gates. Standards for the electrical installation will also be of wood.

The Magnetic Observatory at Hermanus was designed by the Public Works Department, who kept in close touch with Dr. A. Ogg, Magnetic Survey Adviser.

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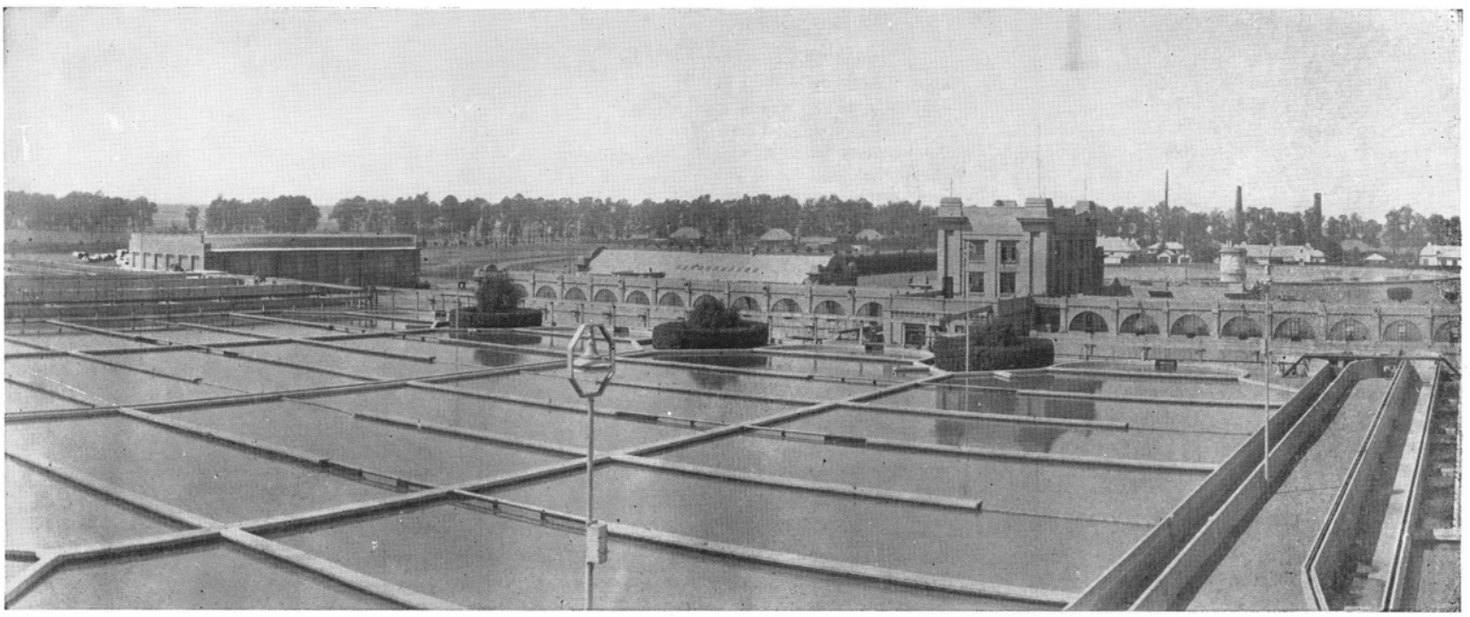

FILTRATION PLANT EXTENSIONS

at——

VEREENIGING

60 - Million Gallons a Day Rand Water Board Scheme Nears Completion

For the information contained in this article we are indebted to the kind offices of Mr. M. Udwin, M.Inst. C.E., M.I.Mech.E., Chief Engineer, Rand Water Board, Johannesburg.

★

CONSIDERABLE extensions to the Rand Water Works at Vereeniging are now nearing completion. These extensions, known as the Additional Water Supply (1938) Scheme, will increase the normal output of the Vereeniging Station to 60 million gallons of water a day. Taken together with the 10 million gallons of water a day available from the Klip River Valley, the Board will then have a quantity of 70 million gallons a day for distribution on the Witwatersrand for the service of a population of 1,140,000.

The highest single-day consumption up to the present has been 58·76 million gallons, registered on November 23, 1938; but this quantity will probably be exceeded during the present summer months. Peak demands of short duration, when in excess of the pumping capacity, are met from the clear-water storage reservoirs situated on the Witwatersrand.

The plant is designed to meet the average consumption during the highest month. This reached the figure of 49·843 million gallons a day during October, 1939. It is anticipated that the present designed capacity of 70 million gallons a day will be sufficient to meet the demands of consumers for about two to three years.

One of the most interesting sections of the Works at Vereeniging is the filtration plant, not only from the point of view of the water engineer, but also from that of the architect.

The building housing this filtration plant presents something unique in architecture in that it is a single-storey building 1,100 feet long, with a width of only 16 feet. Contrary to what might be expected, this enormous disproportion achieves an impressive effect, the length of the elevation being relieved at intervals by massive pylons or towers rising above the structure. These towers serve a functional purpose in that they house the chlorination and auxiliary plant, and support large clear-water tanks at a height sufficient to create the necessary head for the water used in flushing the filter beds.

As may be seen from the illustrations, the building is an enclosed control gallery comprising a 5-foot-wide centre walk-along with continuous balconies on both sides giving access to the control valves. The filter beds are exposed and flank the building on both sides. From these filter beds the filtered water passes through control boxes inside the gallery and discharges into the underground, clear-water collecting reservoirs.

The machinery and plant inside the control gallery are painted dark green, and the control boxes are faced with white glazed tiles finished with a golden-brown capping. The walk-along or central corridor and the control balconies are covered with a dark red rubber strip with black borders. The walls and ceiling are distempered white.

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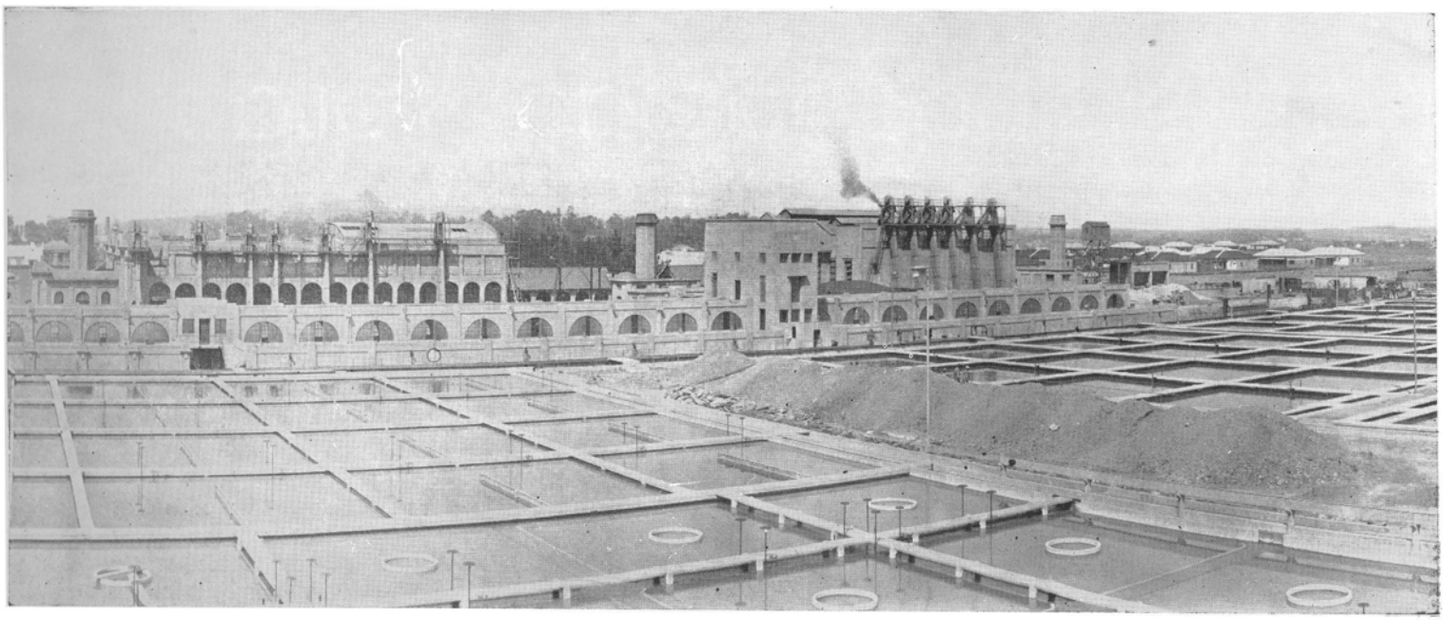

This panoramic view of the Rand Water Board Works at Vereeniging shows in the foreground the extensive system of sedimentation tanks. The long building in the rear is the Filtration Plant Control Gallery described in this article. In the background may be seen the Boiler House and Pumping Station.

Historical Note THE filtering of water for the Witwatersrand dates only from 1923, when the works at Vereeniging were opened.

In 1914, the Rand Water Board adopted the original Vaal River Scheme. This scheme provided for the supply of water from the Vaal River, and was divided into four parts of 5 million gallons a day each. Up to this time water supplies for the Witwatersrand had been drawn from boreholes and wells situated in the Klip River Valley; and the water was pumped direct into supply without filtration.

In the Vaal River Scheme an impounding reservoir was formed at Vereeniging by the construction of the Vaal River Barrage, situated some 25 miles downstream from Vereeniging. This impounding reservoir has a capacity of 13,633 million gallons of water, which was sufficient for an abstraction of 20 million gallons a day.

Under this scheme the water was, and still is, abstracted from the reservoir at an intake station at Veereeniging and raised by means of vertical spindle centrifugal pumps to the main pumping station for clarification, sedimentation, filtration and chlorination. The water is then pumped to the Board's station at Zwartkopjes, a distance of about 30 miles, from where it is repumped into service reservoirs on the Witwatersrand. In order to distribute the water, a total maximum pumping head of 2,000 feet is required.

The first 5-million-gallon filtration unit, consisting of 8 Patterson rapid-gravity filters each 24 ft. long by 14 ft. wide, was completed in 1923. These were arranged in two blocks of 4 placed *vis-à-vis*, and separated by a central control and operating gallery 16 ft. wide. This formed part of the projected 20-million-gallons-a-day scheme which, when completed, would form equal extensions on each side of a central house comprising offices and the lime and alum stores of the chemical treatment plant.

In 1929, the second instalment of 5 million gallons a day was completed when an additional 10 Patterson filters were built on the opposite side of the control gallery to those first installed. These were followed in 1932 by a third instalment consisting of eight Candy filters each 24 ft. long and 26 ft. 6 in. wide. The year 1934 saw the completion of the 1914 scheme of 20 million gallons a day by the installation of a further six Candy filters. With this final installation the control gallery was cut through the central block so as to give ease of control and to provide a separate laboratory.

Expansion DEVELOPMENT on the Witwatersrand from 1931 onwards not only exhausted all provision made under the 1914 scheme, but resulted in the necessity for considerable additional storage in the Vaal River and further abstraction rights.

Under the Vaal River Development Scheme Act of 1934, the Government constructed the Vaal Bank Dam about 10 miles above the Board's storage area, the projected total capacity being about 870,000 acre-feet, or 234,471 million gallons. This storage enabled additional water to be abstracted by the Board, and also provided water for Government irrigation purposes on lower reaches of the Vaal.

Following the building of this dam, provision was made for the Board to abstract a quantity of 60 million gallons of water a day in addition to the 20 million gallons a day provided under the 1914 Act. In the Vaal River Development Scheme (Amendment) Act of 1937, the Board obtained rights to abstract a further 70 million gallons a day, making the total 150 million

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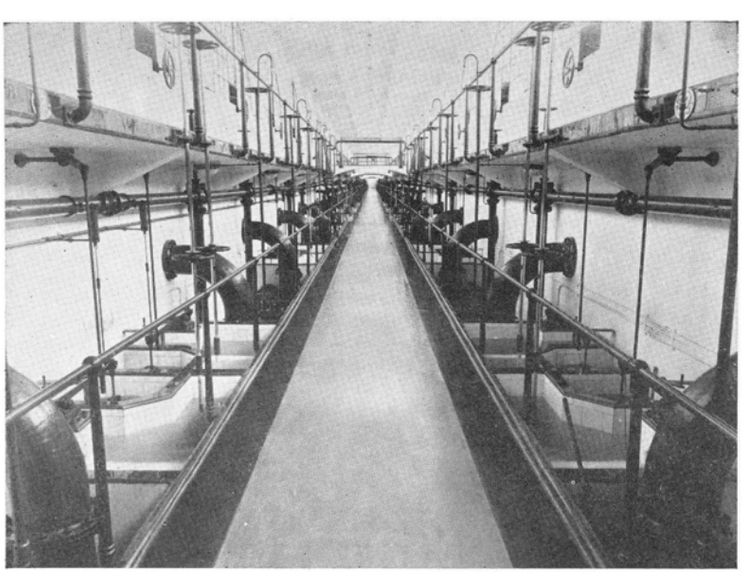
gallons a day. This figure, it must be remembered, represents the abstraction rights of the Board and not the capacity of its plant.

In 1935, plans were prepared for extensions to the Vereeniging Station to deal with 40 million gallons of water a day, to be carried out in units of 10 million gallons. The location of the sedimentation system adjoining the filters made it necessary to extend the existing filtration building in a westerly direction only, so that the water drawn off from the sendimentation system could be conveyed easily to the filters. This factor has resulted in the long continuous line of buildings housing the filtration plant.

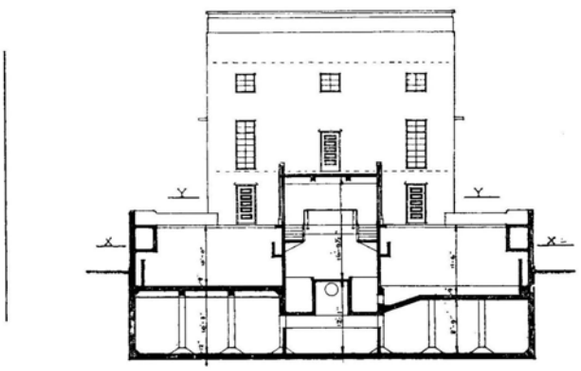
The first unit of this scheme for an additional 10 million gallons a day was completed towards the end of 1936. In 1937, a further extension of 10 million gallons a day was put in hand, followed in 1938 by an additional scheme for 20 million gallons a day. This final unit is now nearing completion.

The extensions to the filtration plant to provide for this increase of 40 million gallons a day consist of 4 blocks of 10 Candy filters, each 22 ft. 6 in. long and 32 ft. wide. Each block of filters is divided by a central tower supporting overhead tanks for providing a head of water necessary for washing. The chlorination plant and auxiliary pumps are also housed in the towers.

Construction THE whole of these extensions have been carried out in reinforced concrete, the floors being 9 in. thick and the walls 6 in. thick. The depth of the filters is 10 ft. Of this depth, the first 3 ft. 6 in. is filled with graded stone and sand. In the case of the Candy filters this filtering medium consists of 4 in. of ½ to ¼-inch clean hard water-worn stone, 4 in. of ¼ to 1/10-in. stone, 4 in. of coarse sand (10 to 20 mesh) and 30 in. of fine sand (20 to 30 mesh). In the case of the Patterson filters, a larger stone is used for the bottom layers.



Interior of Control Gallery.



SECTION - C-D

The general principle for filtering the water is that known as " rapid gravity " as distinct from the " slow sand " and " pressure " filters. The sedimented water is admitted at each end of a block of filters by a lateral flume which conveys the water to each individual filter. A head of about 5 ft. of water is maintained over the sand bed, which is sufficient to induce a " rapid-gravity " flow through the bed. The filtered water is collected below the sand by a closely-spaced system of nozzles and pipes which feed into a central collecting channel. The maximum designed rate of flow is 80 gallons per square foot of sand surface per hour, the normal rate being 60 to 65 gallons. This rate of flow is controlled by automatic valves.

Each filter is in service for a maximum period of 56 hours. It is then cleaned by introducing compressed air at a pressure of 8 lb. per square inch into the manifold system under the sand bed. The agitation of the bed is followed by a reverse flow of clear water from an overhead tank, this water being run to waste until all impurities have been removed.

In the case of the later filters, an improved surface flush has been introduced. The wash water rises from the sand bed, and is driven off over a side weir spanning the whole width of the filter. The rising wash water is kept running sufficiently long to clean the sand thoroughly, the layer of dirty water remaining on the bed being flushed off by the broom action of the surface flush. This result is obtained by introducing sedimented water along the side opposite to the side weir. By means of special baffle plates the body of water travels across the filter bed and pushes the dirty water into the discharge bay. A considerable saving in wash water results. With the previous method a large proportion of wash water was used for removing the dirty water from the surface of the sand bed.

It is anticipated that the scheme will be completed early in 1940. There will then be 72 filters available for service, having a total sand area of 43,346 square feet.

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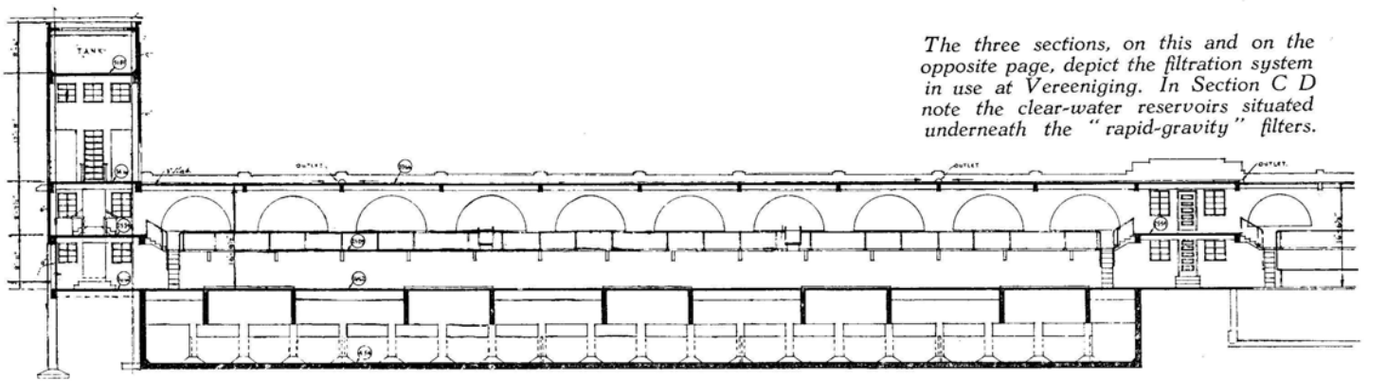
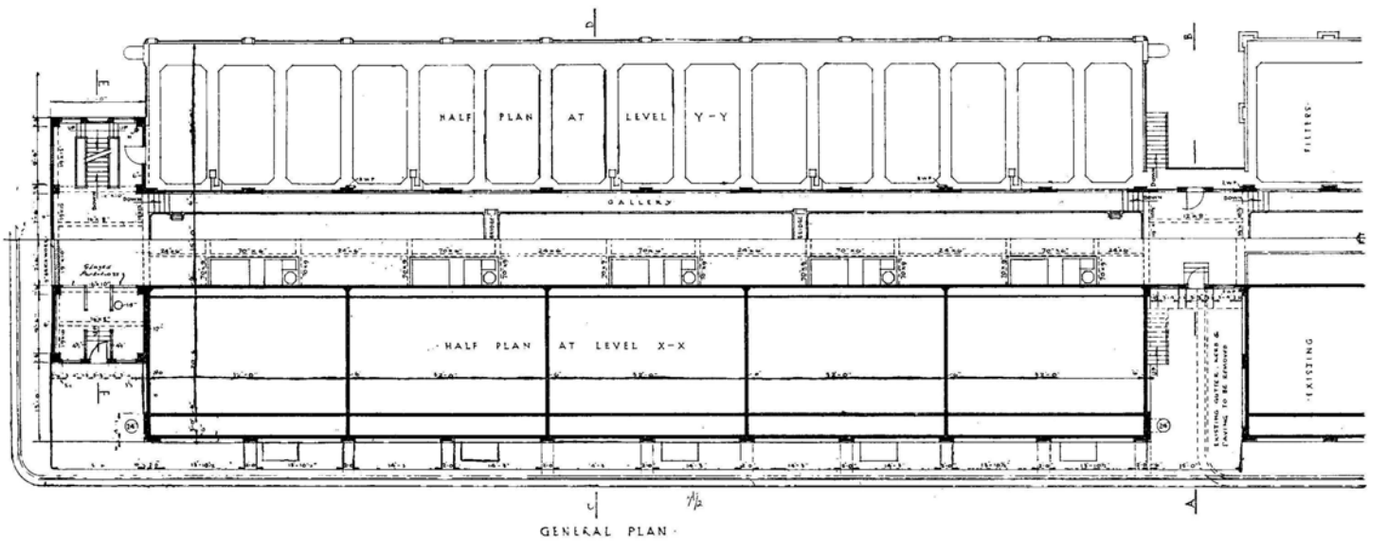


The three sections, on this and on the opposite page, depict the filtration system in use at Vereeniging. In Section C D note the clear-water reservoirs situated underneath the "rapid-gravity" filters.



GENERAL PLAN

THE Rand Water Board was constituted on the recommendation of the Witwatersrand Water Supply Commission 1901-2, by Ordinance No. 32 of 1903 (Transvaal). Further powers were conferred on the Board by Ordinance No. 48 of 1904 and many subsequent Acts. Having taken over the water undertakings of the Johannesburg Waterworks Estate & Exploration Coy., Ltd., the Vierfontein Syndicate, Ltd., and the Braamfontein Coy., Ltd., the Board commenced the supply of water to the inhabitants of the Witwatersrand on the 31st March, 1905, at which date approximately 2½ million gallons a day were being sold. This supply was obtained mainly from the wells and boreholes on the farm Zuurbekom. Various schemes and works have been carried out since that date, including the Vaal River Scheme. The total amount expended by the Board in the acquisition and development of its undertaking during the thirty-six years of its existence approximates £9,000,000.

The Board consists of 30 members, of whom one is Chairman (Mr. S. A. van Lingen) appointed by the Government of the Union of South Africa; 14 represent the Transvaal Chamber of Mines; five the Johannesburg Municipality, the remaining ten being the representatives of the South African Railways Administration and the Municipalities of Benoni, Boksburg, Brakpan, Germiston, Krugersdorp, Randfontein, Roodepoort-Maraisburg, Springs and Nigel.

The Secretary of the Board is Mr. A. C. Collie, and the Chief Engineer Mr. M. Udwin, M.Inst.C.E., M.I.Mech.E.

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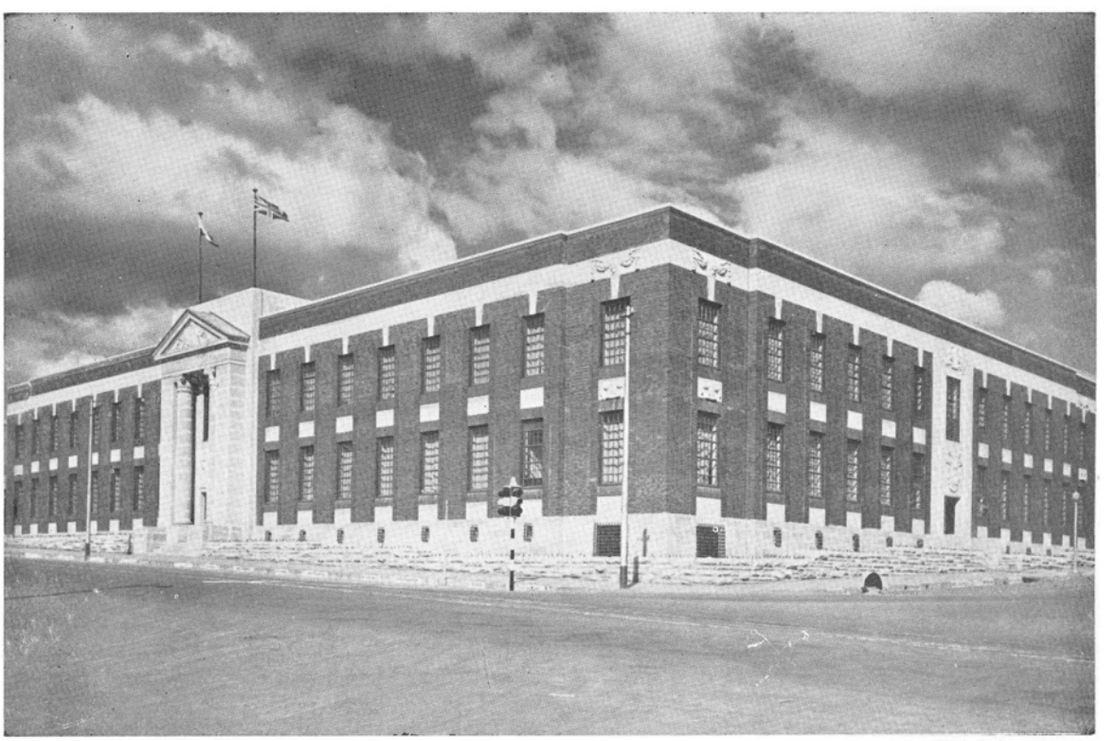
Pietermaritzburg's New Government Offices & Magistrates' Courts



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Construction Details

IN August, 1934, the results of the competition for the new Government Offices and Magistrates' Courts at Pietermaritzburg were announced. The design submitted by Messrs. Moffat & Hirst was placed first.

The following is an extract from the report of the Assessor, Mr. J. S. Cleland, at that time Secretary for Public Works:

"The first design, No. 18, provides for a generally satisfactory and convenient arrangement on broad simple lines. The entrances and concourses are sensibly arranged for the convenience of the public, solicitors and staff, and there is clear and convenient access to all parts of the building.

"The arrangement for Natives and prisoners with access to the courts is good. Generally, the placing of the offices is sound, but there are many matters of detail in arrangement which require more consideration with this scheme, as with all the schemes. The architectural treatment is simple and good and the proposals for construction and material generally suitable. The lighting and ventilation throughout is good.

"The estimated cost is not unreasonable."

Thus having deservedly won this important competition, the architects, having solved the main plan of the scheme, set about working out the many details still to be decided upon, and preparing the working drawings and specifications.

In March, 1936, the bills of quantities, prepared by Messrs. Sinclair & Walters, went to tender, the lowest tender being £43,560.

On 13th July, 1936, building operations were commenced, and at the end of 1938 the building was completed and occupied by various Government Departments.

The completed cost of the building contract was £45,500, the whole scheme, including heating, lighting and ventilation, etc., costing £66,500.

THE building has its two main façades on to Commercial Road and Pietermaritz Street. It is of multi-coloured faced bricks on a base of stonework, with stone dressings and stone surrounds to the main entrances, and is relieved at intervals with symbolic carved stone panels.

The ground floor is occupied by the Criminal Courts, various Court and Government offices, including the offices of the Native Affairs Department and the Revenue Department, and a large public concourse, giving access to the public space of the Criminal Courts. The prisoners' concourse is situated on this floor, opening off the prison van driveway, and flanked by the various cells. Direct access from this concourse to the prisoners' docks is given by means of a basement corridor.

This whole floor is provided with adequate lavatory accommodation.

On the first floor are situated the two Civil Courts, with all their necessary adjuncts, while provision has been made for another two at a later date. The Department of Mines, the local Forestry and Dairying Sections of the Department of Agriculture and Forestry, and the Department of Justice are all housed on this floor. A museum and a laboratory are part of the Department of Mines' accommodation.

In addition to the usual lavatory accommodation, a comfortable ladies' rest room and lavatory is supplied on this floor.

Corridors, entrances and public concourses have dadoes of face-brick, with lino or quarry-tile floors. The floors of the offices and court-rooms are of wood-block. The court-rooms are treated with acoustic spray, and are heated and air-conditioned.

This new, spacious and pleasing building is not only an asset to the city, but also a credit to the architects responsible for its design and the builders entrusted with its erection.

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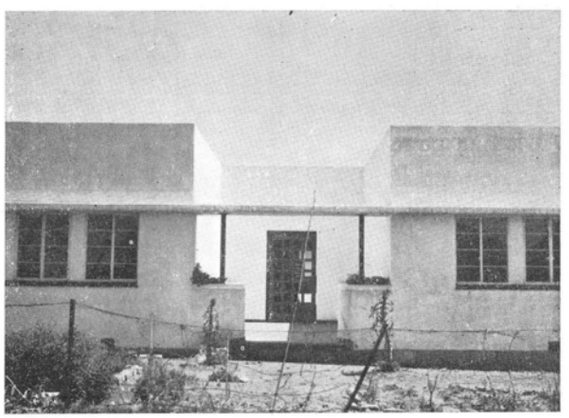
The SCHOOL BUILDING PROBLEM

Ferguson Coloured School at Pretoria West Offers Virtuous Example Of Simple Direct Planning



STAFF ENTRANCE.

VIEW FROM NORTH-EAST.

In this simple building the Transvaal Provincial Administration has given a fine lead to architects in this country regarding the solution of the "school building problem," that is, maximum accommodation with minimum cost, efficiency, durability and fitness of purpose.

The essence of the conception displayed in this building is simplicity. The designer has been well rewarded for his strict adherence to this element. — ED.

THE Ferguson Coloured School, previously known as the Marabastad School, at Pretoria West, provided an exercise in planning on an awkward site under very difficult conditions.

In this there were two major problems. In the first place it was necessary to plan a large school — for 400 children — on a comparatively small site, giving at the same time correct orientation and the maximum of playground space. In the second place it was essential to avoid, during the process of building the new school, any interference with the existing wood-and-iron class-rooms, which were in use and could not be demolished until the new building was ready for occupation.

These problems were still further complicated by an existing structure of two class-rooms which had been placed awkwardly in the middle of the site facing the main thoroughfare, Von Weilligh Street. These class-rooms were too valuable to be demolished, and yet too ugly and badly sited to admit of their being incorporated in the new school building.

In spite of these preliminary obstacles, however, a plan was evolved which has since proved itself to be most satisfactory. This plan is composed in such a way that the staff-rooms and cloak-rooms form a central hub, from which radiate the class-rooms in two wings at right angles to each other. The verandahs are along the north and east sides. The Principal's office is so situated that from his door he can command a view along both rows of class-rooms. The cloak-rooms are at points convenient to the girls' and boys' entrances respectively, arranged to avoid cross-circulation when the children enter from the playground.

The class-rooms along the north side have been fitted with folding partitions to allow of their being thrown open into a single large hall when necessary. Advantage has been taken of the fall of the ground to step down the floor levels of the class-rooms two feet, so that when used as a hall this space will be sufficiently high in proportion to its size, although the roof-level is kept the same throughout the building.

Colour Scheme THE internal finish of the school is excellent. The walls of the large cloak-rooms are tiled in white glazed tiles up to a height of 5 feet. The remaining rooms have blue-dadoes and cream-distempered walls and ceilings. The staff-rooms and class-rooms have fireplaces with slow-combustion stoves.

Externally the school has a modern appearance, with clean, straightforward lines. The design of the roof makes unnecessary the usual unsightly and inconvenient verandah posts.

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VIEW FROM SOUTH-WEST.

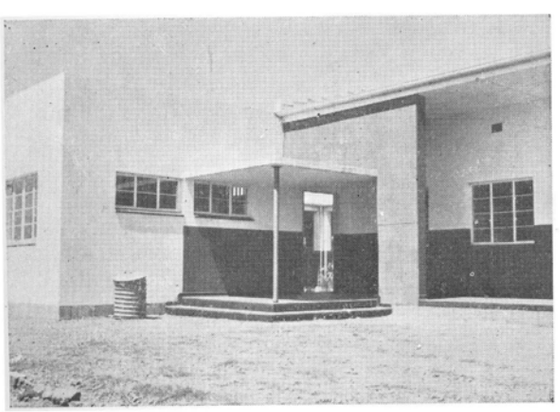
An interesting point of design is the staff entrance. This is enclosed by two blank walls on either side with an open lattice door at the far end. A pleasant feature is the small internal courtyard, planted with shrubs.

The boys' and girls' entrances are each emphasised with a fairly large projecting concrete hood.

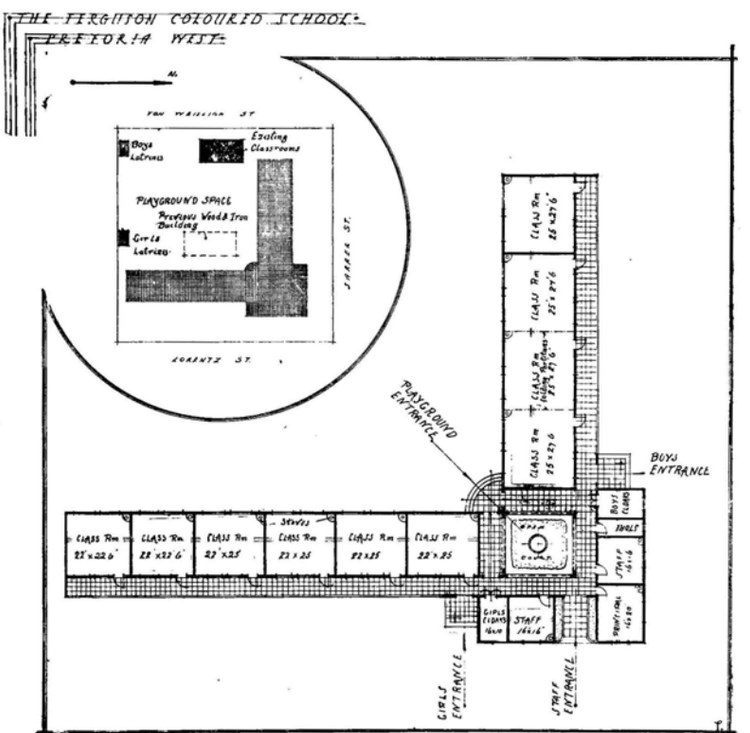
The colour scheme outside comprises white walls with painted dadoes of deep blue. An occasional accent of bright orange on small but important elements of the design is included. The verandah floors are of black granolithic and the eaves soffits and verandah ceilings are of gypsum board distempered a pale duck-egg blue.

The Ferguson Coloured School was designed in the office of the Provincial Architect, and built by Messrs. R. Leggatt (Pty.), Ltd., in breeze-concrete blocks of their own manufacture. The total cost of the work, including latrines, drainage and electric light, was £5,409.

On the road from Hartebeestpoort Dam to Pretoria the school building is plainly visible, and many persons have remarked on this one bright spot in a drab locality. It need hardly be said that they have found a closer inspection worth while.



BOYS' ENTRANCE.



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Book Reviews:

THE DISPOSAL OF SEWAGE. By T. H. P. Veal, B.Sc., A.M.I.C.E. Second Edition. *(London: Chapman & Hall. 10/6.)*

A NUMBER of books have been written recently on Sewage Disposal, undoubtedly due to the considerable developments which have taken place in various methods of sewage treatment during the last ten years.

This volume, "The Disposal of Sewage," first published in 1927, and republished in a revised form this year, has been brought up-to-date in every respect and in particular with regard to the activated sludge process, sludge digestion and the use of mechanical appliances in settlement tanks. An interesting innovation is the inclusion of alternative schemes for dealing with the sewage from a town of 50,000 inhabitants.

The work is refreshing in its frank adherence to the subject and its marked avoidance of any form of "padding," a fault far too frequently present in technical works. It deals with, in its direct and explicit manner, an historical introduction to the subject, quantitative analysis of sewage, preliminary processes, settlement bacteria beds, bio-æration tanks, land, treatment, disposal of sludge, layout and construction of sewage works, and rural sewage disposal.

The volume has been purposely prepared by the author for use by students, but it will also undoubtedly take its place in the reference library of well-established technical and professional men dealing with the subject.

E. T.

★

ARCHITECTURAL DRAWING AND DETAILING. By J. Ralph Dalzell, B.S., and James McKinney. *(Chicago: American Technical Society.)*

THE authors have compiled this abundantly illustrated book "to present the general practices and techniques of architectural drawing, detailing, rendering in pen and ink, and landscaping in such a manner as to serve beginning students, laymen and draftsmen who are in need of this practical information."

There are some very excellent illustrations and chapters, but the volume on the whole is disappointing, — some of the work might even be put down as amateurish. The all-important subject of lettering has been dealt with in a very light-hearted way, the examples offered to the student as good lettering being, indeed, very poor. I would not, however, altogether condemn the volume — I would even recommend it to the discriminating student as a work from which many useful "tips" could be extracted and much excellent knowledge gained.

E. T.

SHEET METAL WORK. By William Neubecker. *(Chicago: American Technical Society.)*

BY publishing this volume the American Technical Society has again shown how alert and wide awake it is to the needs of the technical man and practical tradesman, who is looking for advancement.

It is fittingly described as a manual of practical self-instruction in the art of pattern draughting and constructive work in light and heavy-gauge metal. The author will, I am sure, delight any student of the subject by his direct approach to any problem, clear illustrating and the brief but practical solutions offered.

The work contains full information on practical problems in mensuration for sheet metal workers, patterns for air ducts and fittings, cornice work, roofing, skylights, problems for heavy and light-gauge metal, and problems in the workshop, and information on tools and methods of obtaining patterns.

The book should prove a valuable text for the student as well as an excellent reference for the most experienced metal worker. E. T.

★

HOW TO ESTIMATE FOR BUILDING TRADES. By Gilbert Townsend, S.B., J. Ralph Dalzell, B S., and James McKinney. *(Chicago: American Technical Society. 1940.)*

THIS book of 629 pages is superbly and abundantly illustrated with accurate and explicit diagrams and sketches, and also contains, in a pocket, eight "blueprints" for instruction. It covers all the fundamentals and detailed principles of estimating.

The work, however, requires a very close examination and careful consideration before its value can be assessed accurately. A casual inspection leaves the impression that it would be of very little use to the estimator in South Africa, for it is an American reference book and all prices are quoted in dollars, and American building principles, which differ somewhat from the South African, are naturally followed.

A deeper study at once brings to light the fact that the volume virtually offers a complete explanation of the procedure to be adopted in order to produce an accurate "price" for any particular trade. It moreover presents a wealth of detailed constructional and technical knowledge, without which anyone attempting to estimate accurately must be doomed to failure. The advanced student or experienced estimator must, however, be left with the feeling that a great quantity of the elementary construction instruction in all the building trades should have been mastered thoroughly long before the estimating process can be attempted successfully.

In conclusion, it may, however, be said that the book offers much food for thought for the builder, technical man and student. E. T.

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GYPSUM as a Building Material

Some Notes On Its Use In The Form Of Plaster Boards Called "Selenite"

THERE are many advantages to be obtained from the use of artificial building materials, among these being lightness, ease of construction with purpose-made units, fire-proofing in certain instances, in addition to the intrinsic advantages of the particular material. Gypsum falls into this category, for, although it is a mineral, it cannot be used in its natural form. It has to be "processed" or converted into forms applicable to building construction, such as blocks, plaster-boards and plaster on metal lathing. Gypsum is "processed" in South Africa as a plaster-board bearing the name of "Selinite," possessing qualities of great value to architects and building contractors.

"Selinite" is made in the following way. It has as its base liquid plaster of paris, that is, a mixture of water and gypsum previously deprived of part of its water of crystallization. The liquid plaster is run into moulds having the shape of the board to be manufactured. Specially selected teased sisal, in a carded form, is then introduced into the plaster, ensuring a strong, even reinforcement. The plaster is then trowelled, and when it sets it is placed in a rack to dry. In three to four days' time it becomes a hard composition, forming a rigid board. The sisal reinforcement, which has great tensile strength, appears in volume very near the surface, thereby eliminating any chance of distortion or cracking.

FIRE-PROOF QUALITIES.

AS the "Selinite" plaster-board incorporates the same qualities as gypsum in this regard, a brief outline on the fire-resistance of gypsum will be of interest. It should be mentioned first, however, that in heat insulation tests conducted by the Physics Department of the Witwatersrand University, the thermal conductivity of "Selinite" plaster-board was established at ·72 to ·77 B.T.U.'s per square foot per hour per inch of thickness, with an average value of ·73, over a temperature range of 100 to 200 degrees F. It is fire-proof and resists an oxy-acetylene flame at 4,400 degrees C.

Gypsum is a soft mineral which is converted into plaster of paris by calcining, a process which robs it of part of its water of crystallization. This plaster has the very valuable property of taking up water, and, by a crystallizing process, becoming again converted into gypsum. Delicate experiments have shown that this plaster in setting neither expands nor contracts.

The fire-proof qualities of this plaster have been recognised in Europe for many years. In a number of experiments, plaster blocks in 18 tests of fire and water for periods of 1 to 2 hours, stood successfully, resisting the passage of flame, smoke and water and remaining stable and strong afterwards. The tests showed that the effect of one hour of high temperature was to recalcine the block to a depth of ⅜ in., while two hours of high temperature carried the recalcining to a depth of ¾ in. The effect of a stream from a fire hose was to wash off the recalcined material.

From various tests the following conclusions have been drawn regarding fire-proofing.

Low thermal conductivity is an essential point, as with partitions heat must not be conducted through to set alight the furniture on the opposite side. Steelwork must also be protected from the weakening effects of heat. The fire-proofing material must not expand or contract, it must not burn and it must not support combustion. It must be of a light weight for, at its best, fire-proofing material is a dead load and plays no part in the support of the building structure. It must also be sufficiently strong to stand up against the impact of a fire stream, and combine with all these qualities the virtue of low cost. It can be stated that "Selinite" plaster-board fulfils all these requirements.

Besides its qualities as a building and fire-proofing material, "Selinite" plaster-board has the additional advantage that it can be manufactured to any specified shape or size. It is particularly adaptable for use as a partition walling, for ceilings and as a wall-lining material, in which panel effects may be created with the use of cover moulds at the joints. Alternatively it can be flush-jointed by stopping the joint with plaster of paris, or reversed and putty-plastered. Both these latter methods produce a monolithic effect.

An instance of the special use of this plaster-board may be found in the new central block of the Johannesburg General Hospital, where it was used as a lining material for the ward ceilings, it being specially desired that the ceiling joints should be invisible. It was used in the new Chamber of Mines Hospital at Cottesloe and the Onderstepoort Laboratory, Pretoria, as well as in many other large buildings recently erected. In the Johannesburg and Chamber of Mines Hospitals all the work was purpose-made to architect's details.

"Selinite" is also manufactured in the form of cornices and mouldings to architect's details or from stock moulds, so that its use as a medium of interior architectural construction is practically unlimited. Purpose-made work is a speciality.

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Tenders Invited

THE following are particulars of the more important tenders which have been invited, up to the time of going to press, by Government Departments and Provincial Administrations. In each case the date by which tenders must be submitted and the office to which application should be made, are given.

BRIDGES AND MATERIALS.

Valsch River Bridge (Kroonstad—Ventersburg road), consisting of substructure, approaches and reinforced concrete superstructure in three 50-ft. girder spans and one 132-ft. tied-arch span (P.W.D. tender 440): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Bloemfontein. **28th December.**

BUILDINGS AND ALTERATIONS, ETC.

Additions to Laundry Block at Mental Hospital, Bloemfontein (P.W.D. tender 439): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Bloemfontein. **28th December.**

Hutments for Artillery at Potchefstroom Military Camp: Contract No. 3 (P.W.D. tender 450): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Johannesburg. **28th December.**

Hutments for Artillery at Potchefstroom Military Camp: Contract No. 2 (P.W.D. tender 449): Particulars as above. **28th December.**

Married Quarters for Officers (two blocks), Warrant Officers (one block), Junior N.C.O.'s and Privates (four blocks) at Tempe, Bloemfontein (P.W.D. tender 445): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Bloemfontein. **4th January.**

Married Quarters for Senior N.C.O.'s (six blocks), Junior N.C.O.'s and Privates (eight blocks), at Military Camp, Wynberg, C.P. (P.W.D. tender 446): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Cape Town. **4th January.**

Repairs, renovations and alterations to the High School, Rustenburg: Room 31, Third Floor, Velra House, Bureau Lane, Pretoria; and School Board Office, Rustenburg. **20th December.**

CENTRAL HEATING.

Central heating installation; supply, delivery and erection at New East Wing additions, Central Government Offices, Pretoria (P.W.D. tender 443): P.W.D., Pretoria (Room 531, 'phone 5477). **1st February.**

CHEMICALS, LABORATORY EQUIPMENT, ETC.

Specimen bottles and wooden containers, supply of, to Onderstepoort Laboratory (tender S.O. 560): Union Tender and Supplies Board, 271 Visagie Street (P.O. Box 371, 'phone 3121), Pretoria. **18th January.**

Chemicals, supply of, to Onderstepoort Laboratory (tender S.O. 551): Particulars as above. **18th January.**

Liquid Paraffin, supply of, to Onderstepoort Laboratory (tender S.O. 552): Particulars as above. **18th January.**

Microscopes, supply of, to Division of Entomology, Department of Agriculture and Forestry, Pretoria (tender S.O. 549): Particulars as above. **11th January.**

Arsenic pentoxide, supply of, to Department of Agriculture and Forestry (tender S.O. 556): Particulars as above. **18th January.**

Flake naphthalene, supply of (tender S.O. 176): Particulars as above. **28th December.**

Routine microscopes, supply of, to Onderstepoort Laboratory (tender S.O. 590): Particulars as above. **28th December.**

Glass specimen jars, supply of, to Onderstepoort Laboratory (tender S.O. 596): Particulars as above. **1st February.**

ELECTRICAL EQUIPMENT.

Generators, magneto, motor-driven; supply of (P.O. tender 823): District Stores Superintendents, Johannesburg, Cape Town, Port Elizabeth, East London, Durban, Bloemfontein; Divisional Controller, P.O. Pietermaritzburg; Controller of P.O. Stores, Room 77, G.P.O. Annexe, Pretoria. **25th January.**

Electric book-lift, supply, delivery and erection at South African Library, Cape Town (P.W.D. tender 435): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Cape Town. **25th January.**

Electric passenger-lift, supply, delivery and erection at G.P.O., Pretoria (P.W.D. tender 436): P.W.D., Pretoria (Room 531, 'phone 5477). **1st February.**

Generating plant; supply, delivery and erection at Bekker School Farm: Room 31, Third Floor, Velra House, Bureau Lane, Pretoria; and Messrs. Viljoen & Keyter, 19–20 Geneva House, Loveday Street, Johannesburg. **20th December.**

FURNITURE, FITTINGS, ETC.

Wood boxes, ladders, stools, benches and cupboards; supply of (P.O. tender 824): District Stores Superintendents, Johannesburg, Cape Town, Port Elizabeth, East London, Durban, Bloemfontein; Divisional Controller, P.O. Pietermaritzburg; and Controller of Post Office Stores, Room 77, G.P.O. Annexe, Pretoria. **21st December.**

ROADS AND ROAD-MAKING EQUIPMENT.

Equipment for Provincial and National Roads construction in Cape Province, supply of (C.P. tender F. 127/1939): Particulars in Cape of Good Hope Official Gazette of 17th November. **22nd December.**

WATER SUPPLY AND IRRIGATION EQUIPMENT.

Boring for water in Wepener, Albert and Fauresmith Districts (Irrigation tender 247): Controller of Stores, Irrigation Department, 474 Carl Street (P.O. Box 277), Pretoria. **28th December.**

Hand-lift and screw-lift sluice gates, supply of (Irrigation tender 240): Controller of Stores, Irrigation Department, 474 Carl Street (P.O. Box 277), Pretoria; and Circle Engineers, Irrigation Department, at Cape Town (P.O. Box 23), Port Elizabeth (P.O. Box 3020), and Durban (P.O. Box 1018). **28th December.**

MISCELLANEOUS.

Portable air compressor, supply of (P.O. tender 822): District Stores Superintendents, Johannesburg, Cape Town, Port Elizabeth, East London, Durban, Bloemfontein; Divisional Controller, P.O. Pietermaritzburg; Controller of P.O. Stores, Room 77, G.P.O. Annexe, Pretoria. **18th January.**

Locomotive boilers (3), for S.A.R. & H. (tender 2499): Railway Stores at Salt River, Uitenhage, East London, Durban, Bloemfontein, Pretoria; and Chief Stores Superintendent, New Park Station Chambers, Johannesburg. **5th February.**

Wheels and axles, supply of, to S.A.R. & H. (tender 2513): Particulars as above. **19th February.**

Grain tanks, supply of, to Department of Native Affairs for Potgietersrust District (tender S.O. 589): Union Tender and Supplies Board, 271 Visagie Street (P.O. Box 371, 'phone 3121), Pretoria. **28th December.**

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Tenders Accepted

THE following are particulars of some of the contracts which have been awarded by Government Departments and Provincial Administrations. The name of the successful tenderer is given in each case, and wherever practicable, the contract price :—

BRIDGES AND MATERIALS.

Ifafa River Bridge, erection of: U. Bandini. £9,607 0s. 1d.

BUILDINGS AND ALTERATIONS, ETC.

Alterations and additions, Census and Statistics Block, Pretoria (P.W.D. tender 400): G. Newlands (Pty.), Ltd., Pretoria. £26,313.

Aeration unit and Native quarters, Sewage Disposal Works, Waterkloof Aerodrome, Pretoria. (P.W.D. tender 401): Donald Junor, Pretoria. £1,435.

Garages, S.A.M.C., Voortrekkerhoogte (P.W.D. tender 395): J. R. Dewberry, Pretoria. £2,179.

Superstructure, Magistrates' Courts, Pretoria (P.W.D. tender 356): R. Leggatt & Co. (Pty.), Ltd., Pretoria. £107,854.

Additions to Quartermaster's Stores, Voortrekkerhoogte (P.W.D. tender 409): C. van Dordrecht, Pretoria. £388.

Mental Hospital, Contract No. 1, Krugersdorp (P.W.D. tender 402): P. Osborn, Johannesburg. £108,727.

Extension to Military Hospital, Voortrekkerhoogte (P.W.D. tender 407): Engel & Ruyter, Pretoria. £11,743.

Military camp, S.A.A., Bluff, Durban (P.W.D. tender 424): J. T. Ross & Son (Pty.), Ltd., Durban. £4,470.

Meteorological Building, Western Province, Fruit Research Station (P.W.D. tender 410): L. de Kock, Wellington. £997.

Additions, etc., Wool Research and Bacteriological Laboratories, Onderstepoort (P.W.D. tender 393): Grant & Son. (Pty.), Ltd., Pretoria. £5,700.

Alterations and additions, etc., to Public Offices, Post Office, etc., Witbank (P.W.D. tender 408): Van Rooyen & Sons (Pty.), Ltd. £859 10s.

Post Office, Automatic Exchange and Mining Commissioner's Offices, Heidelberg (P.W.D. tender 413): Bottom & Oschger (Pty.), Ltd., Johannesburg. £16,350.

CHEMICALS, LABORATORY EQUIPMENT, ETC.

Chemicals for Onderstepoort Laboratory (tender S.O. 508): Lennon, Ltd., Johannesburg.

DRAINAGE AND SANITATION.

Waterborne sewerage at Post Office, etc., Oudtshoorn (P.W.D. tender 396): I. Subersky, Oudtshoorn. £1,125.

ELECTRICAL EQUIPMENT.

Condensers for Department of Posts and Telegraphs (tender A.L. 229): (1) Standard Telephones & Cables, Pretoria; (2) British Insulated Cables, Ltd., Johannesburg; (3) British General Electric Co., Ltd., Johannesburg.

Wire for Department of Posts and Telegraphs (tender A.L. 227): (1) British Insulated Cables (S.A.), Ltd., Johannesburg; (2) Henleys (S.A.) Telegraph Works Co., Ltd., Johannesburg; (3) Associated Engineers Co., Ltd., Johannesburg.

Wire for Department of Posts and Telegraphs (tender A.L. 228): (1) British Insulated Cables (S.A.), Ltd., Johannesburg; (2) R. T. Urquhart & Co. (Pty.), Ltd., Johannesburg.

(1) 50 detectors, (2) 75 telephones (tender P.O. 782): (1) Hubert Davies & Co., Ltd., Johannesburg: £230, f.o.b. British Port; (2) Rogers-Jenkins & Co. (Pty.), Ltd, Johannesburg: £359. 1. 3. f.a.s. Gothenburg.

48 Lamp standards and lanterns for Union Buildings, Pretoria (P.W.D. tender 379): S.A. General Electric Co., Johannesburg. £874 16s., f.o.r., in bond, East London.

Wire (tender A.L. 221): (1) British Insulated Cables (S.A.), Ltd., Johannesburg; (2) British General Electric Co., Ltd., Johannesburg.

FURNITURE, FITTINGS, ETC.

(1) Lockers, letter stackers, letter press; (2) cupboards and cabinets (tender P.O. 779): (1) Thos. Barlow & Sons (S.A.), Ltd., Johannesburg; (2) All Steel Office Furniture (Pty.), Ltd., Johannesburg.

12 Tables (tender P.O. 815): Thos. Barlow & Sons (S.A.), Ltd., Johannesburg. £378.

ROADS AND ROAD-MAKING EQUIPMENT.

Two 12-cu. yd. self-loading scrapers (Tvl. Prov. tender 156/1939): W. S. Thomas & Co. (Pty.), Ltd., Johannesburg. £1,560 each, f.o.r., in bond, East London.

Timber for National and Provincial Roads in Cape Province (C.P. tender F. 92/1939): (1) Premier Timber Co., Ltd., East London; (2) Thesen & Co., Ltd., Knysna; (3) Buffalo Timber Co. (Pty.), Ltd., East London; (4) Hunt, Leuchars & Hepburn, Ltd., Durban; (5) Woolf Engineering Co. (Pty.), Ltd., Bloemfontein.

WATER SUPPLY AND IRRIGATION EQUIPMENT.

Windmill, etc., Fort Jackson Police Station (P.W.D. tender 398): Stewarts & Lloyds (S.A.), Ltd., East London. £250 7s.

(1) Penstock with headgear; (2) sluice valve with headstock (tender I.D. 190): Wright, Boag & Co., Ltd., Johannesburg. (1) £138, f.o.r. Johannesburg; (2) £165, f.o.r. Johannesburg.

MISCELLANEOUS.

Copper wire (tender S.O. 530): (1) Blane & Co., Ltd., Johannesburg; (2) Associated Engineers Co., Ltd., Johannesburg.

Tractor for Loskopfontein Settlement (tender S.O. 437): W. S. Thomas & Co. (Pty.), Ltd., Johannesburg. £371, f.o.b. New York.

Vertical cross-tube boiler for Prince Alfred Infirmary, Grahamstown (P.W.D. tender 369): Reunert & Lenz, Ltd., Johannesburg. £275, f.o.r., in bond, East London.

Tractor (tender S.O. 447): International Harvester Co. (S.A.) (Pty.), Ltd., Durban. £335, f.o.r. Durban.

Printing machine (tender S.O. 461): Argonauts (S.A.), Ltd., Johannesburg. £100, f.o.r., in bond, Port Elizabeth.

Motor-driven D.C. welding plant (Transvaal Provincial tender 159/1939): Arc Engineering Supply Co., Johannesburg. £182 15s., f.o.r., in bond, Cape Town.

Nine 200-amp. portable welding sets, each mounted on a trailer (Tvl. Prov. tender 158/1939): S.A. General Electric Co., Ltd., Johannesburg. £316 10s. each, f.o.r., in bond, Port Elizabeth.

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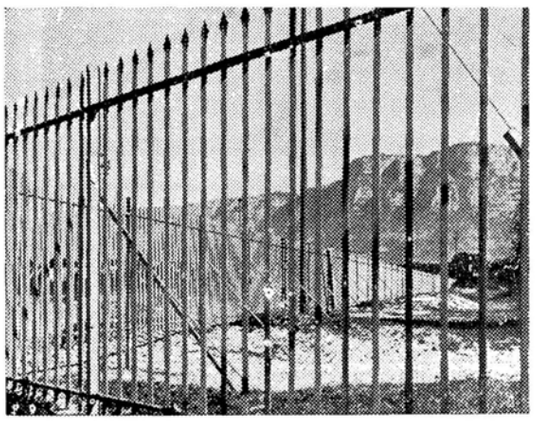

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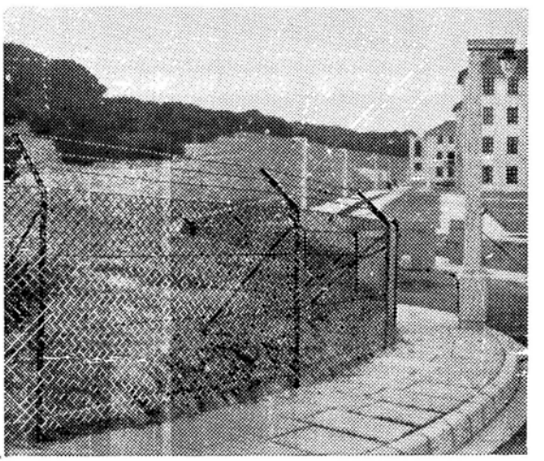

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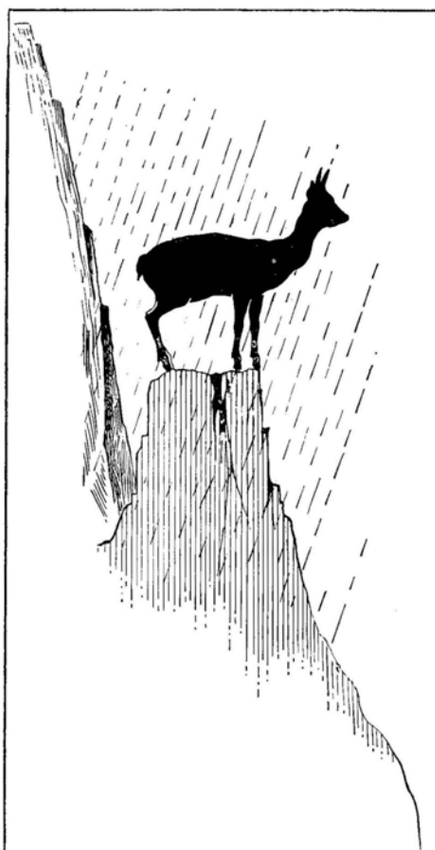

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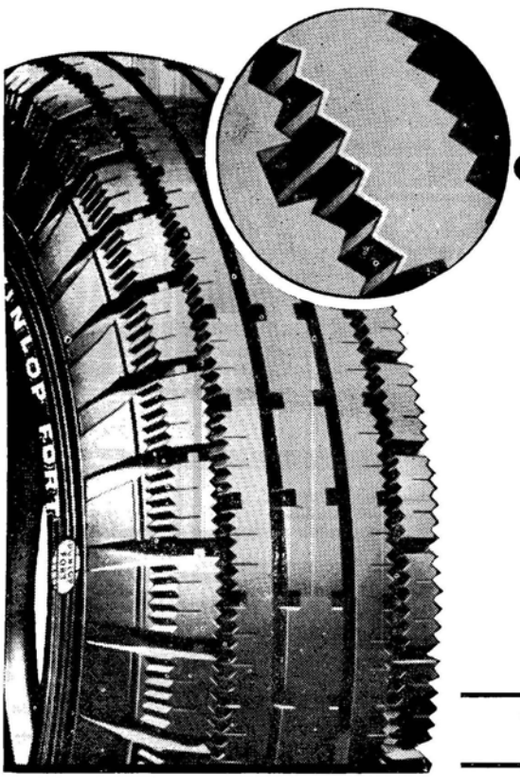

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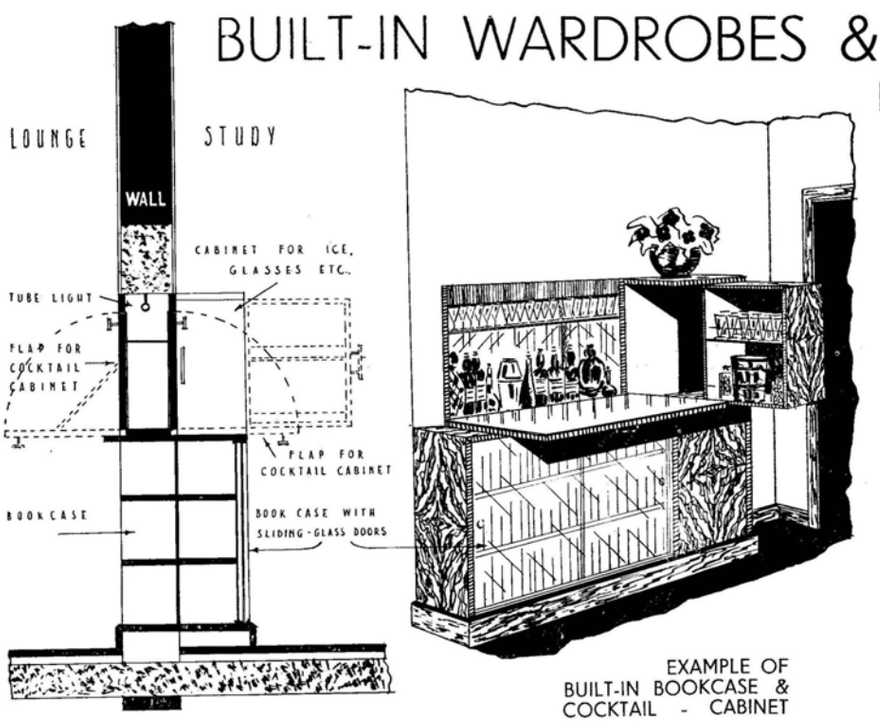

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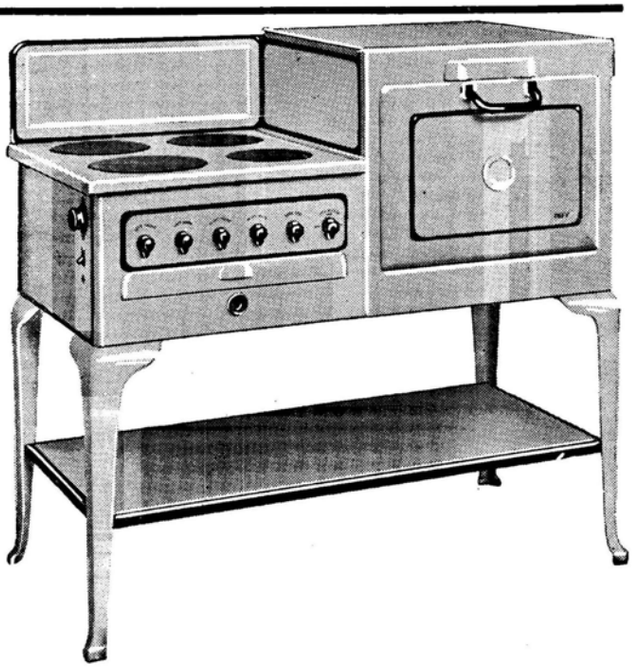

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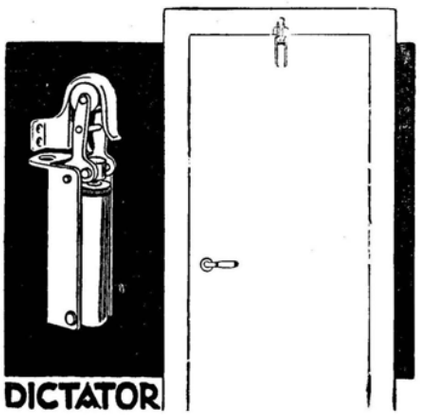

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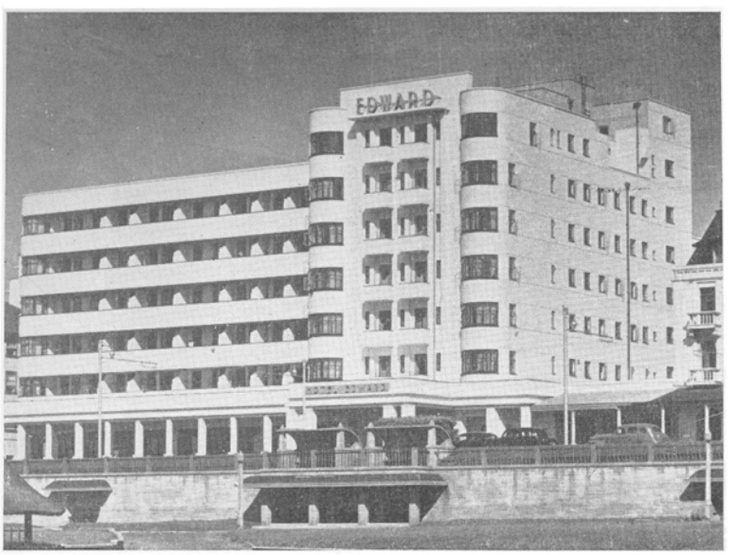

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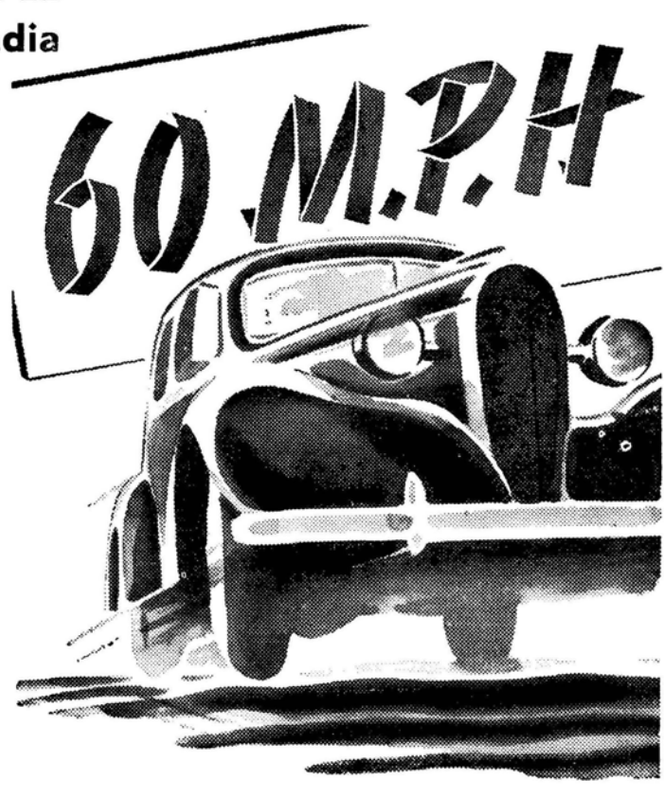

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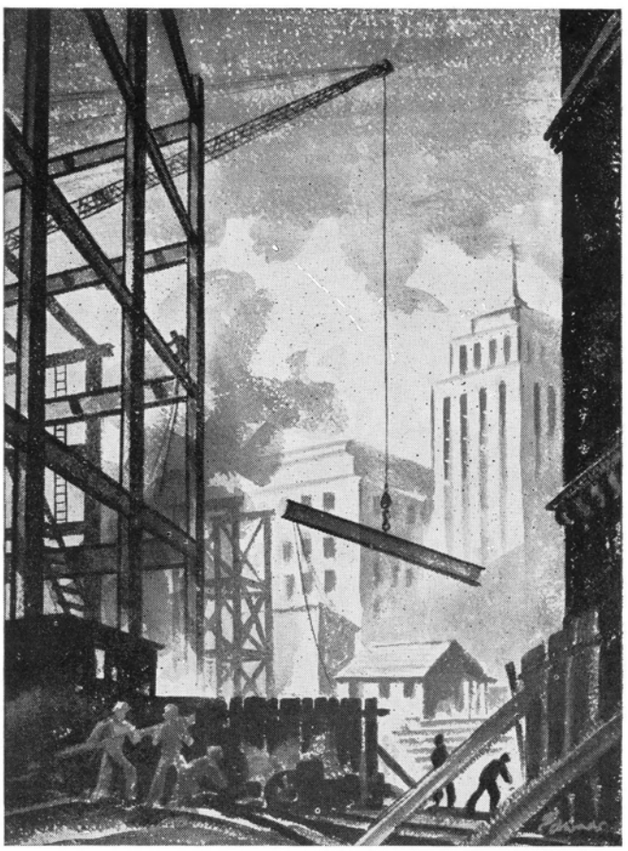

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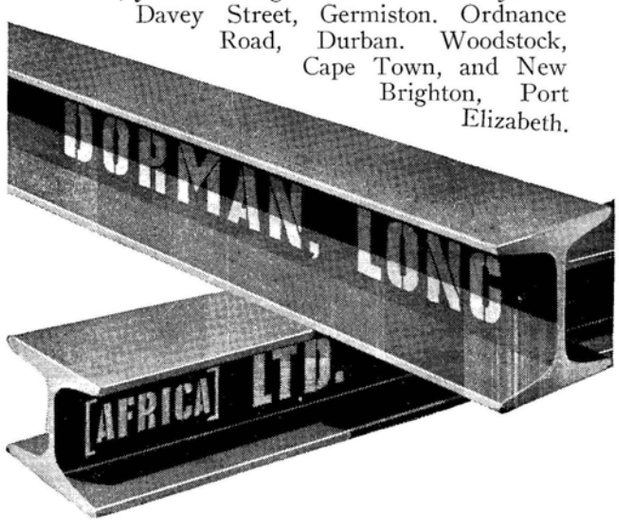

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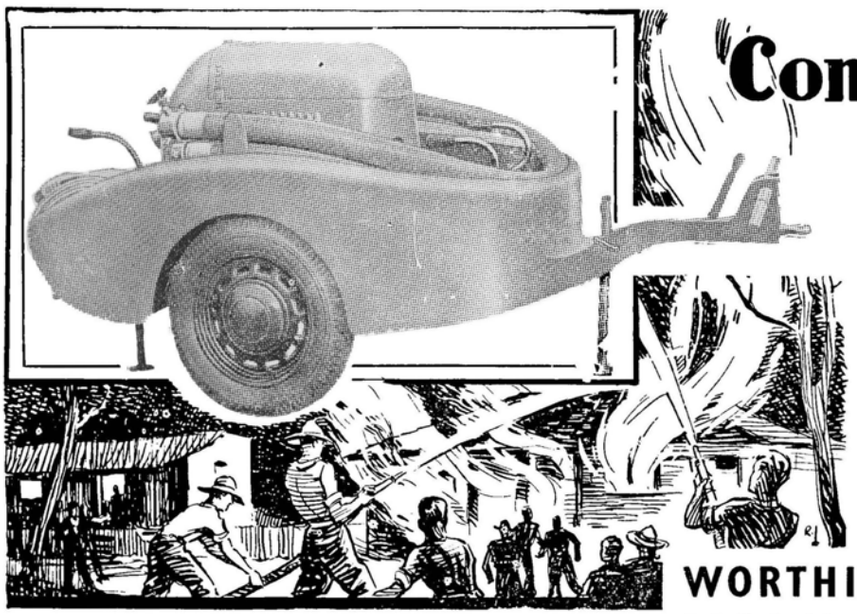

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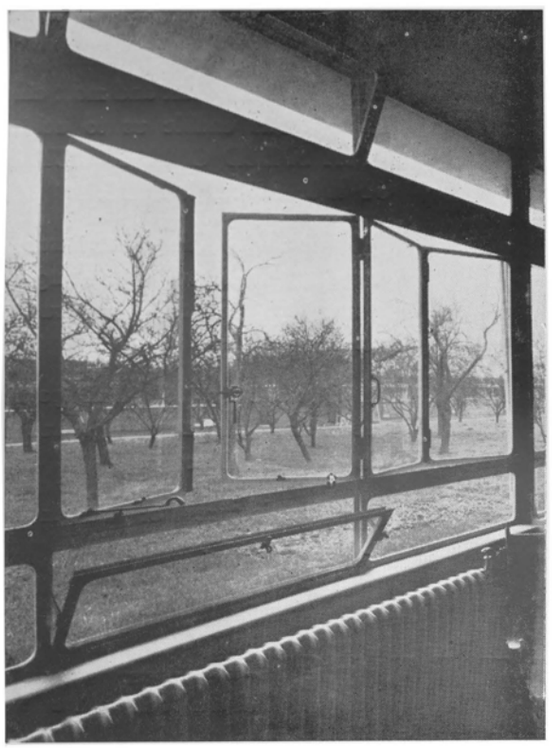

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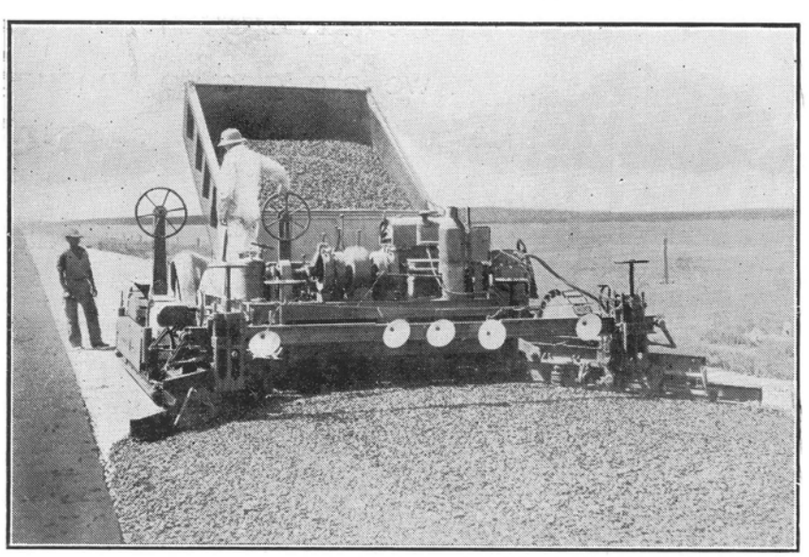

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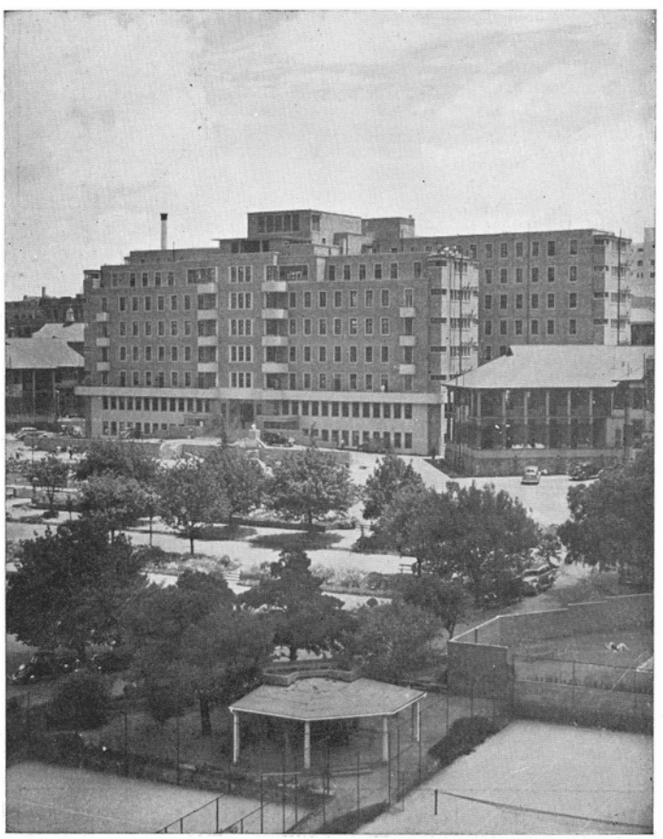

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