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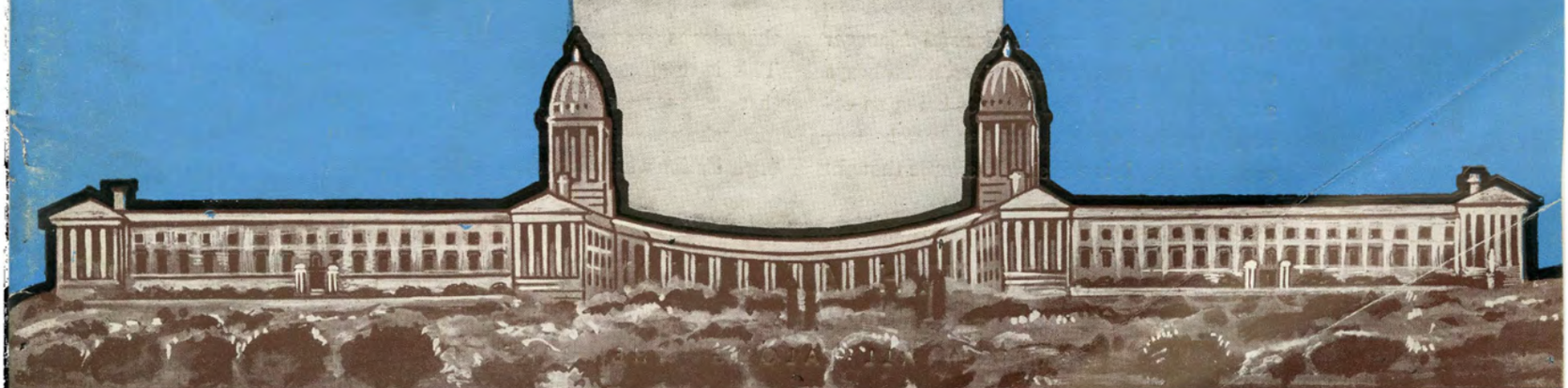
PUBLIC WORKS OF SOUTH AFRICA



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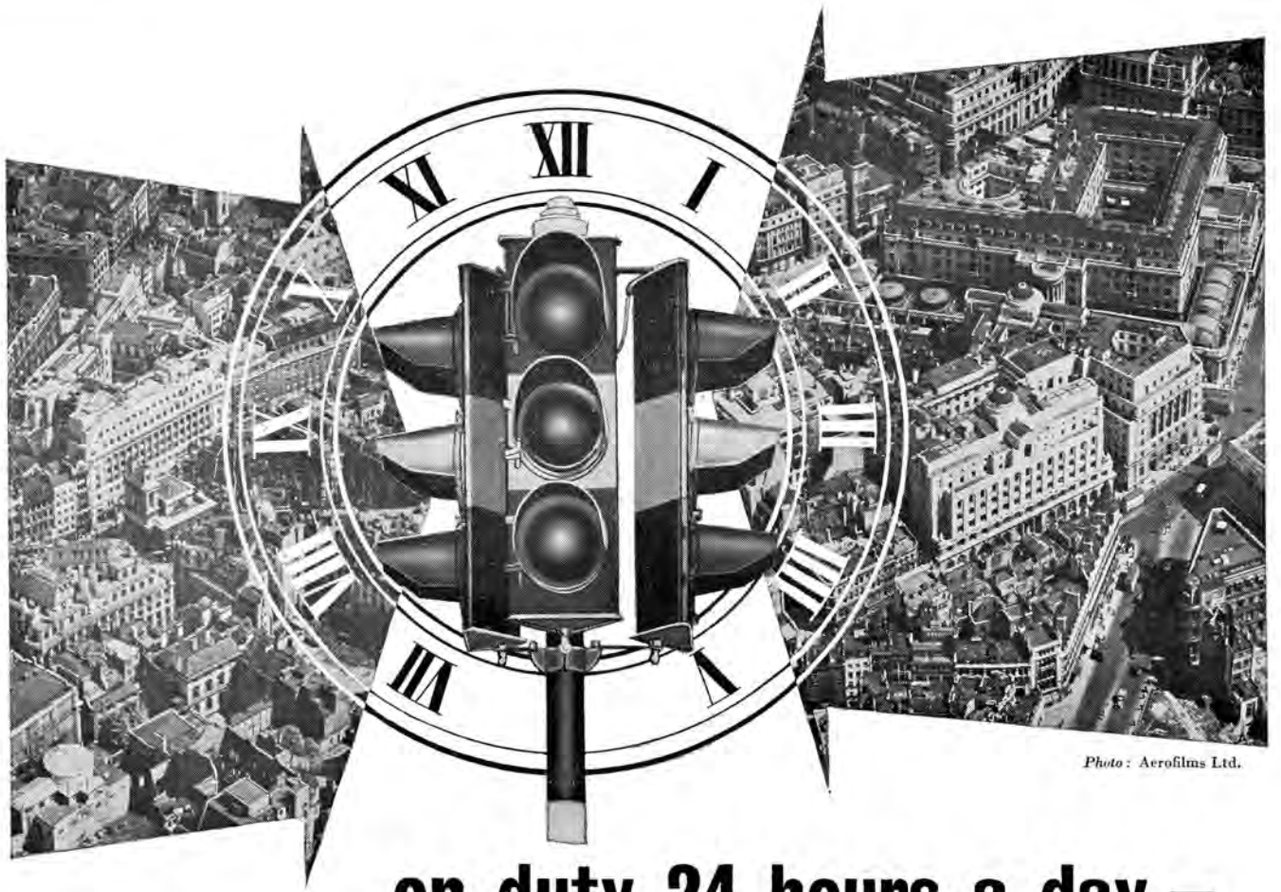

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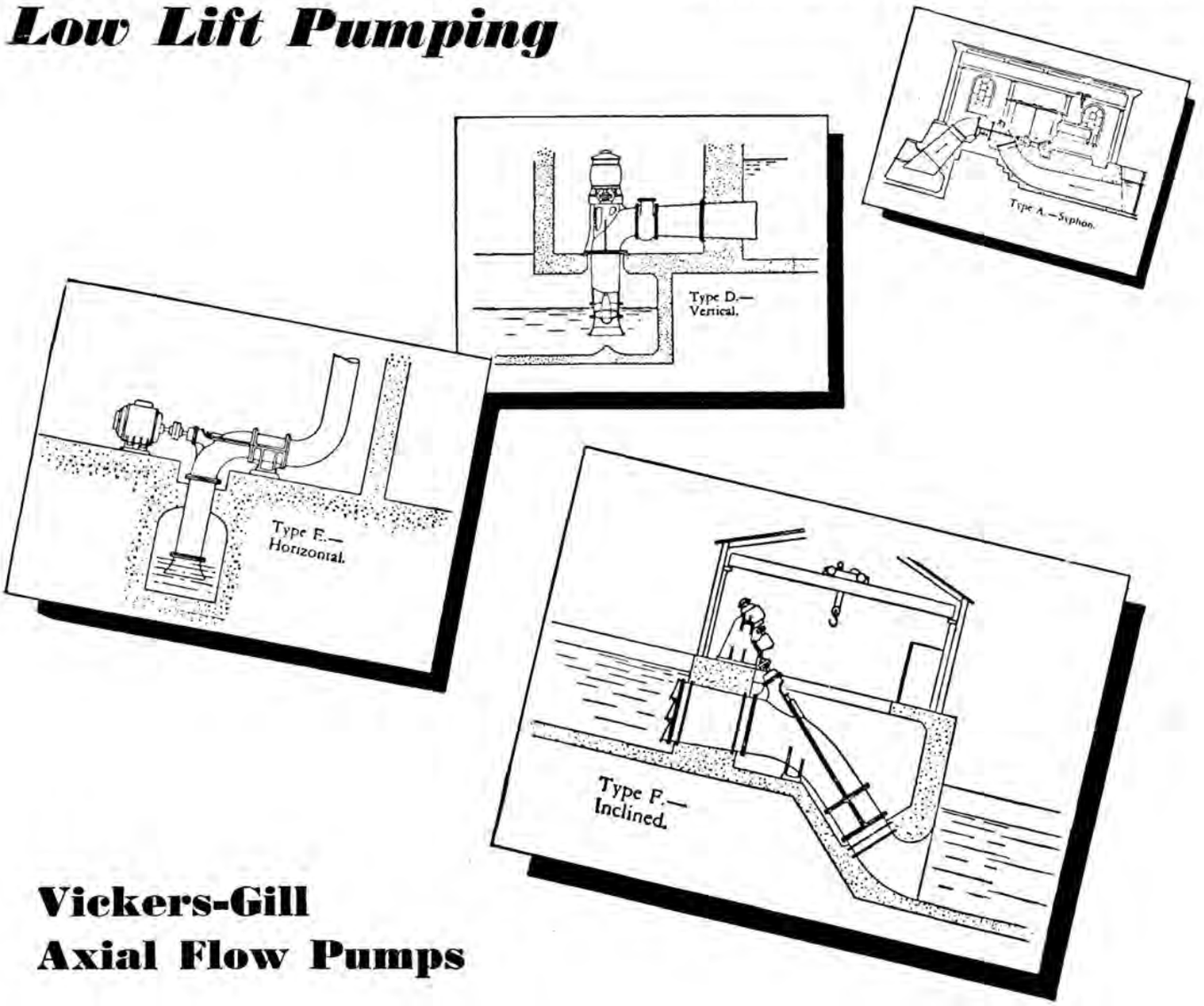

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PUBLIC WORKS OF SOUTH AFRICA, which is published monthly, is intended to keep the public up-to-date in regard to the engineering and building projects of the Central Government, the Provincial and Municipal Governments of Southern Africa and activities overseas.

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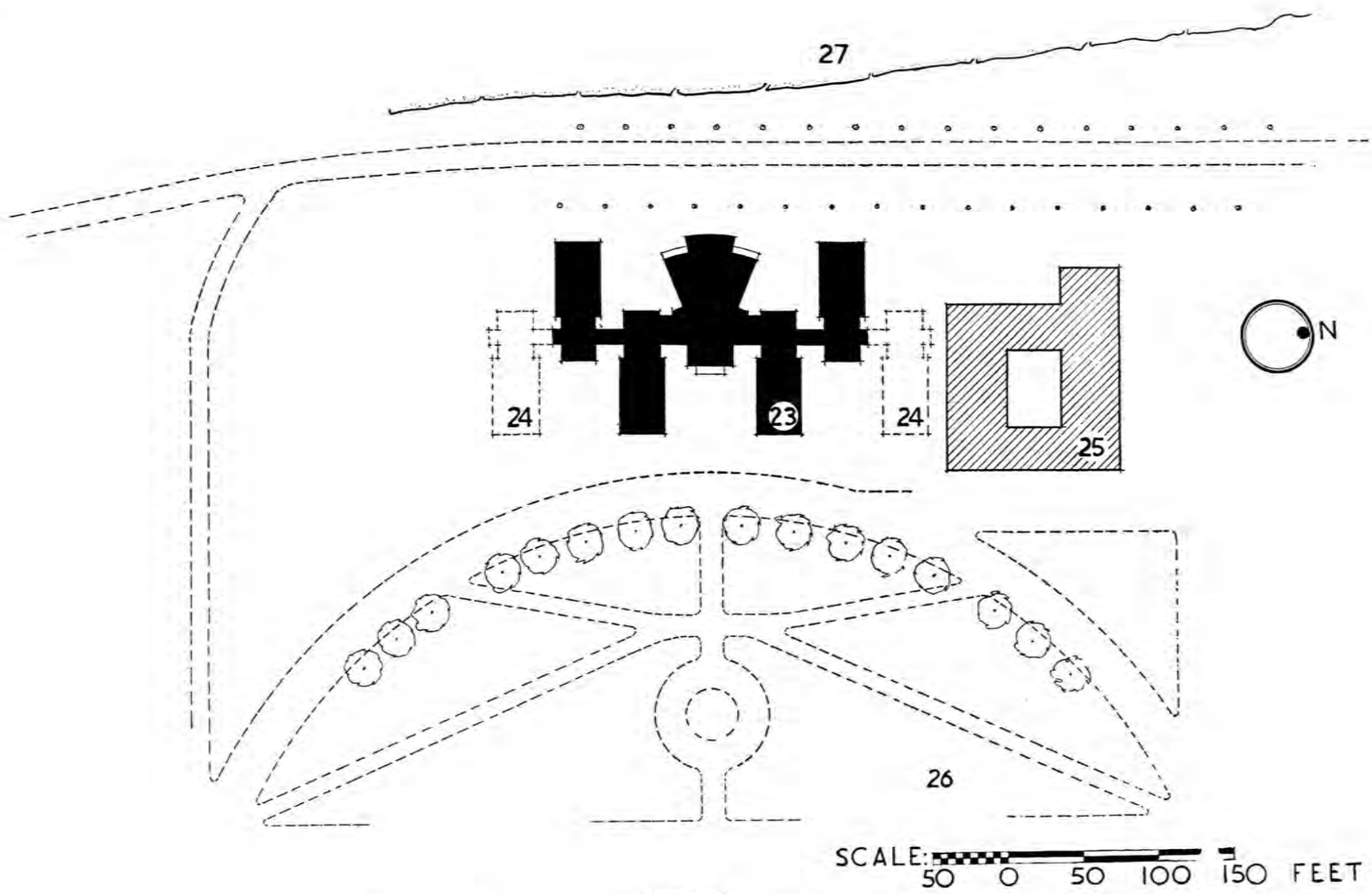


LEGEND.

23. Main building.
24. Possible extensions.
25. Existing Wool Research building.
26. Existing garden, part of proposed future central campus.
27. Existing bluegum plantation.

General site plan for the new Onderstepoort Veterinary Research Laboratories.

VETERINARY RESEARCH LABORATORIES, ONDERSTEPOORT

PROPOSED FACULTY BUILDING

Function of the Building

This proposed building has been planned to fulfil a dual function :—

(a) A teaching function to house Onderstepoort's growing training facilities which form part of the University of Pretoria.

(b) A lecturing function, to give accommodation for staff lectures at Onderstepoort, for eminent visiting lectures, or for general formal occasions, for which at present there is no adequate provision.

General Plan

The plan of the building reflects this double function. In the centre, on ground floor level, approached directly from the main entrance, is the lecture hall which can be used with the minimum disturbance to the rest of the building On either side are two projecting wings connected by a central spine and corridor, having to the south the Chemical Laboratory and Tea Room, and to the north the Toxicological Museum and Staff Rooms. Above these on the first floor are four laboratories which will also serve as lecture rooms, with a small reference library in the centre. Each of these wings is designed on a standard layout, to permit of easy re-arrangement later, and has a small lobby with combined store and preparation room, linking the wing to the central "spine."

Secondary entrances, at the north and south ends of the central "spine," give additional access to the laboratories independent of the central entrance.

Both vertical and horizontal extensions to the building have been designed in the form of an additional floor above the first, and a projecting wing at north and south ends linked by an extension of the central spine : this is shown dotted on the site plan.

THE PLAN UNITS

Lecture Hall

This has been designed to seat approximately 260 people and has a projection room for films or epidiascope The entrance lobbies have been designed as light locks so that late comers will cause no disturbance if a film is being shown.

Chemical Laboratory

This will be used as laboratory only and, therefore, the benches are of double width with the sinks and service connections in the centre, the students working from both sides. As most of the work is done standing, the height of the benches is 3 ft. 3 in. Fume cupboards are provided at the far end, and at the entrance end, for occasional use, there will be a lecturers' platform and blackboard.

Toxicological Museum

This has been placed on the ground floor, near the main entrance, as the exhibits, such as wax models of toxic plants, etc., are of general interest. In fact, this exhibition has always been one of the "show pieces" of Onderstepoort. Owing to the low melting point of the wax from which these models are made, **this room has an independent air-conditioning plant,** housed immediately beneath it, which will operate continuously irrespective of whether the main air-conditioning plant is required or not.

Tea Room

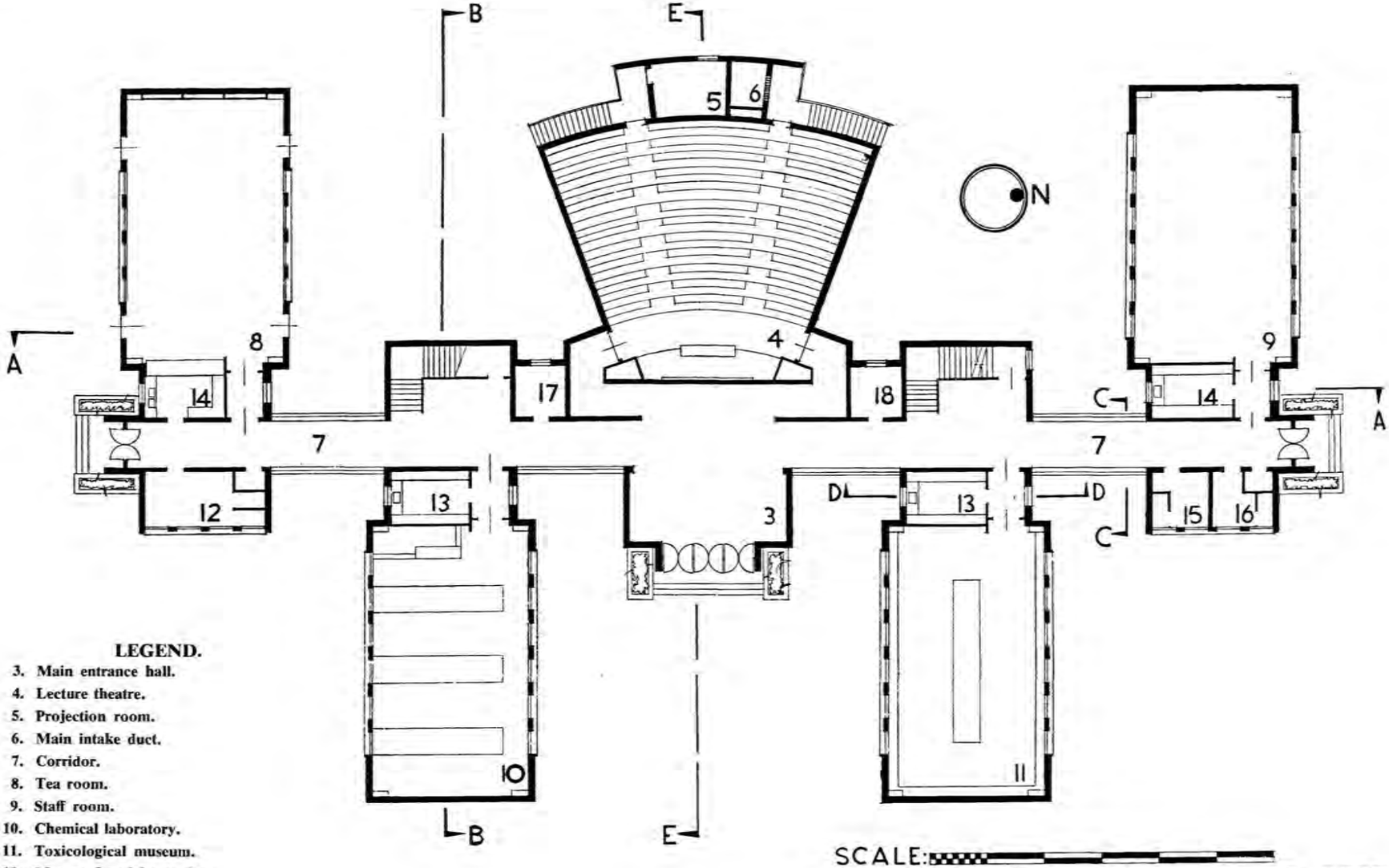
This is primarily for the use of students, and will serve tea, coffee and light snacks in the intervals between lectures. Service will be on the help-yourself cafeteria system and French windows have been provided on both north and south walls, to give the use of sun and shade as required on the lawn on either side.

Staff Room

This has merely been reserved for general staff use and its detailed sub-division has not yet been decided. It has however been designed as a standard wing, so as to be capable of conversion to a laboratory in future.

Lecture Laboratories

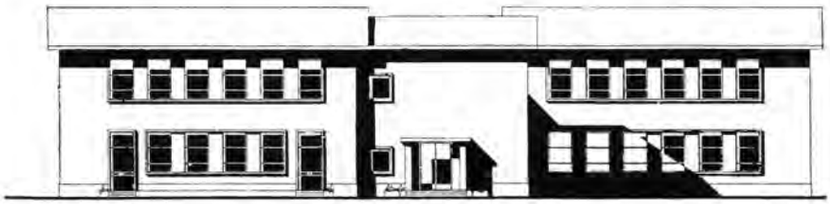
These have been designed as combined laboratories and lecture rooms, so that the benches are single width, with all students, when at work, facing the lecturer at the entrance end. As the students are normally seated, for the taking of notes at lectures, the height of the benches is 2 ft. 6 in. Both in these and the chemical laboratories the main fenestration is to the south, and the north windows provided are only for cross ventilation and protected by projecting hoods to stop direct sunlight penetrating to the working benches at any time of the day or year. For this reason the plan of all laboratories is asymmetrical with the access gangway on the north and all benches project at right angles from the south wall.



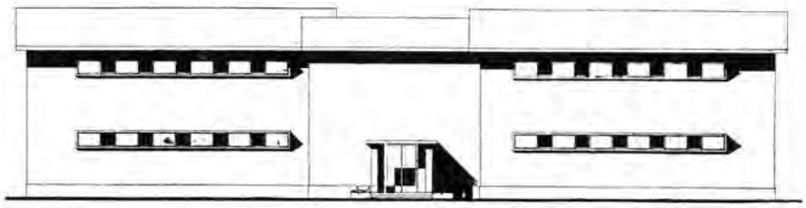
LEGEND.

3. Main entrance hall.
4. Lecture theatre.
5. Projection room.
6. Main intake duct.
7. Corridor.
8. Tea room.
9. Staff room.
10. Chemical laboratory.
11. Toxicological museum.
12. Men students' lavatories.
13. Store and preparation room.
14. Tea kitchen.
15. Ladies' lavatories.
16. Staff lavatories.
17. Cleaner's room.
18. Switch room.

Ground Floor Plan : Onderstepoort Research Laboratories.



Left — South Elevation.



Right — North Elevation.

Above — West Elevation.

Above — East Elevation.

Library

A small reference library with reading desks has been included in a central position for the use of students.

Services

A Plen system of ventilation and heating is planned for the building as a whole, in addition to the separate plant of air conditioning for the Toxicological Museum.

Cold water, gas and electrical points will be provided to all laboratory benches, while hot water will be restricted to the lavatories and Tea Room kitchen. Vents to sink wastes, fume cupboards, etc., will be taken up as brick flues through the ridge at the end of each wing.

Construction

The construction will be of reinforced concrete frame throughout, with 14-inch solid brick external walls. Provision has been made in the frame and foundation to take an additional floor. The ground consists of 6 ft. of black turf over decomposed granite, to which the foundations will be taken in all cases.

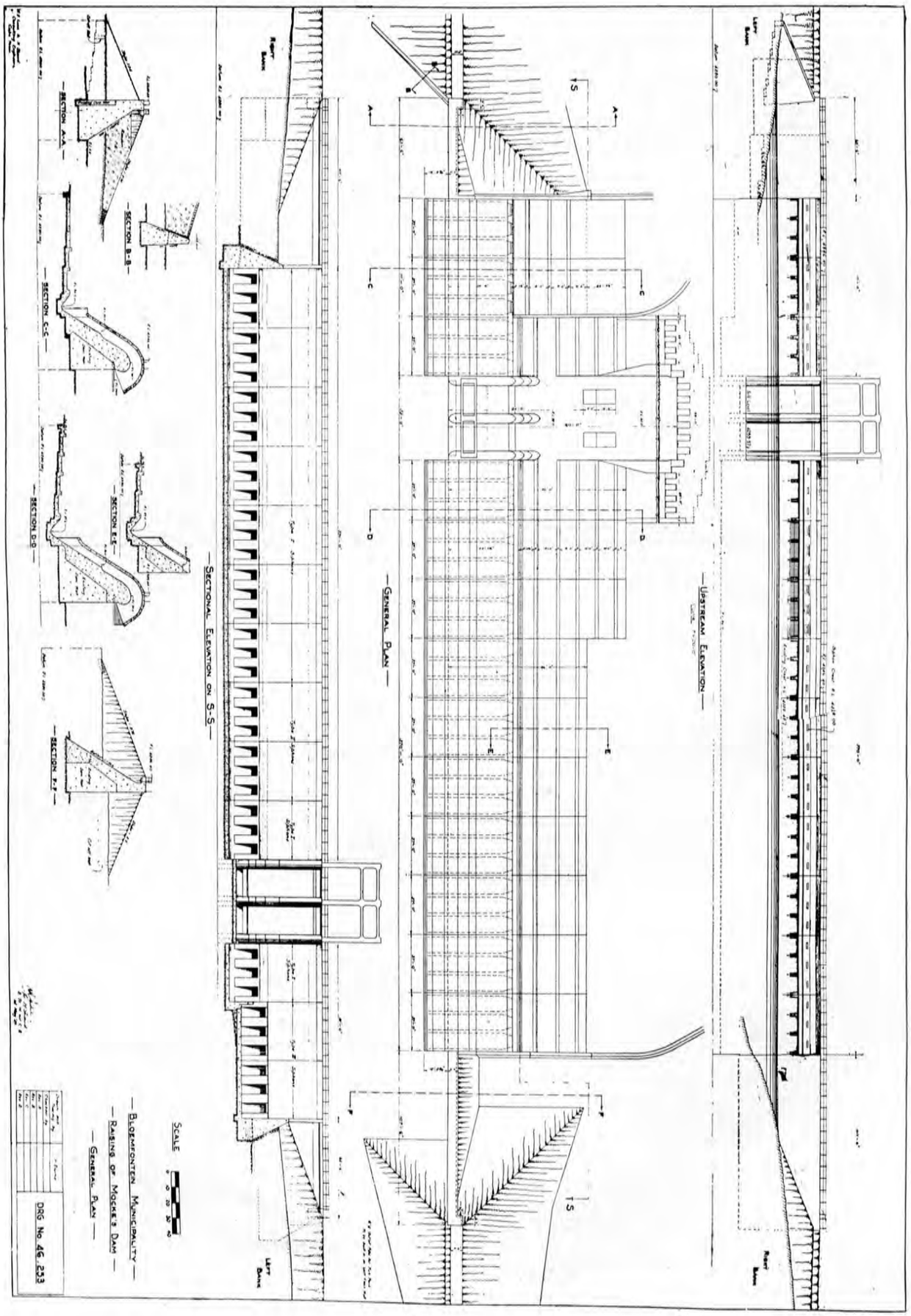
Finishes

The external finish will be light ironspot face brick with painted, plastered concrete hoods and architraves to openings with the plinth of dark purple face bricks. The roof will be of corrugated iron or asbestos with a concealed gutter behind a wood fascia, which will be returned at gable ends as barge boards of the same depth, to ensure continuity of profile.

Siting

The site is immediately south of the existing Wool Research Building, with an existing formal layout on its east front and a gum plantation to its rear. It is hoped it will eventually form the head of a future "campus' which can be formed as the existing buildings become due for demolition.

The proposed building was designed by Messrs. Mallows & Meadley, Johannesburg, and Mr. A. G. Ellis, Private Architects, in collaboration with the Public Works Department, Pretoria.



Elevation, general plan and sectional elevation, showing the methods employed to raise the Mocke Dam.

WATERWORKS EXTENSIONS FOR BLOEMFONTEIN

AS the result of an investigation instituted by the Bloemfontein Municipality in 1942, it was decided to proceed with a scheme for the augmentation of the City's water storage supply.

At that time storage was confined to two reservoirs on the Modder River. The lower, Mazelpoort, is situated 13 pipe line miles from the city, and Mocke's Dam 4½ miles further upstream, with capacities of 318 and 620 million gallons respectively.

An electrically driven pumping plant situated near the dam wall at Mazelspoort supplies water, after sedimentation and pressure filtration, to service reservoirs in Bloemfontein under a static head of approximately 480 feet. The pipe line is a combination of single 20-inch diameter and double 12-inch diameter steel pipes.

The new scheme provided for additional storage the most favourable project of those examined on the Modder River being the raising of Mocke's Dam so as to increase its capacity by 1,700 million gallons to 2,320 million gallons.

In addition, the existing pumping and water purification plants and the pipe line were inadequate for the rapidly rising demand and it was decided, in 1948, to make arrangements to increase the capacity of these items to meet immediate requirements, and by extensions to cater for further expansion.

The original works before alterations, showing gravity section weir with automatic trip falling shutters, 5 ft. 6 ins. high, mounted on the crest.

The Raising of Mocke's Dam

Mocke's Dam was originally constructed as a wall, 18 feet high, with a number of small sluice openings throughout and founded on a dolerite dyke. Owing to increasing demand and the heavy siltation of the reservoir basin, the dam was raised 13½ feet some fourteen years ago.

The original sluices having proved ineffective in clearing silt from the basin, two stoney sluices each 17 feet wide and with sill level at river bed, were built into the wall. In addition the central concrete spillway was equipped with steel falling shutters 5'6" in height. The flanks were formed of earth embankments protected on the upstream side by a concrete apron up to full supply level, with stone in mortar pitching above. By means of suitable operation of the sluice gates the siltation of the reservoir was controlled within limits.

Considerable scour has occurred in the river bed immediately downstream of the sluice gates, where horizontally layered shales abutted the dolerite.

Problems to be Overcome

In preparing designs for an increase of capacity of this reservoir, a number of problems presented themselves. High floods in the Modder River at Mocke's Dam may reach a maximum of 90,000 cusecs, and, as the river banks outside the confines of the comparatively narrow stream channel are of alluvial material, the disposal of the flood waters within the bounds of the channel was considered a necessity.

The height to which the wall could be effectively raised was limited by the height of the river bank on the right side for, at this elevation, the ground surface is virtually level for a considerable distance back from the reservoir and extensive inundation of farm lands was to be avoided.

As Mocke's Dam is a feeder to the Mazelspoort reservoir, where the water level is maintained as near full supply level as possible to preserve the amenities of the pleasure resort there, it was necessary that storage at the former be kept at a maximum to provide for dry weather demand. This indicated that new works would be carried out under storage conditions varying from full supply downwards. Trial borings proved that while the spillway section of the existing wall was founded on hard rock, the flanks were in soft material and the short cut-off walls extending into the embankments had not been taken down to solid foundation. This weakness was further indicated by the emergence of steadily flowing springs at either flank.

Taking the various limitations into consideration it was decided that the full supply level of the dam be raised by 10 feet, and that the necessary widening of the wall be done on the downstream side.

In order to cope with the high concentration of flood water over the main central length of wall, and to avoid undue inundation of land, a siphon spillway design was adopted which would limit the rise of flood water at the dam

The works in the process of construction, with siphons in various stages of completion, the first battery of three being ready for operation.

to a height of 2 feet above the new full supply level. By way of comparison, the use of a plain overall spillway would have resulted in a flood water rise of approximately 12 feet, requiring a heavier section of dam wall and considerably heavier and longer earthen embankments on the flanks.

Siphon Experiments

Siphon installations of the magnitude of that envisaged are rare and little detailed information was available regarding their operation. It was accordingly decided that, before final designs were made, model experiments should be carried out, both on siphon models and on various types of energy dissipating devices to be installed downstream of the siphons, where the high velocity of the water discharged would, without some dissipation, give rise to heavy bed and bank erosion of the river channel.

Having prepared a tentative design on current engineering theory and practice, accurately constructed small scale siphon models with glass sides were tested in the hydraulics laboratory of the University of Cape Town, and information obtained as to such features as discharge capacity, priming and internal pressures at various points.

From a study of the tests so made, it was realised that certain features of the original design would be defective, and it was amended in the light of the knowledge obtained.

For the sluice gates and for the siphon spillway numerous experiments on energy dissipating devices were carried out on a variety of models. The problem here was a complicated one; the sluice gates would have a discharge depth of up to 40 feet, depending on water level in the dam, and would be operated singly or as a pair. The siphons on each side of the sluice gates would operate without the sluice gates for normal water level regulation, and with them in periods of high flood. The sluice gates would also be operated alone for the purpose of scouring the dam, a process which has been found effective in controlling siltation within limits.

Altered Design

The original tentative design for this section of the work was found to be unsatisfactory, and the layout was altered to conform with the experimental findings. The final design, in brief, comprises a siphon spillway across the river bed section of the dam wall, having 30 siphon openings to the right of the sluice gates and 9 to the left. The nominal cross section of each opening is 8 ft. width and 6 ft. depth at the spillway crest. The upstream portion of the siphon hood diverges from the spillway wall and the depth of opening is proportioned to ensure gradual increase of velocity after entrance, and the avoidance of cavitation. Below the crest is a step on the spillway which deflects water flowing over the spillway on to the face of the hood, and by so doing causes an evacuation of air in the siphon resulting in an increase of flow over the spillway until the bore runs full. As the water level in the dam recedes the vent opening in the upstream portion of the hood is uncovered, air is admitted, and the siphon action is broken. The energy dissipator below the sluice gates is in the form of a sunken, concrete-lined pool, having two large baffle piers opposite the gate exits, and at the downstream end a dentated sill.

Immediately below the siphon outlets is a concrete "bucket," or sunken channel, followed by a series of apron slabs gradually rising in level towards their downstream end. At each step is a low longitudinal wall. The purpose of both these installations is to destroy partially the tremendous energy of the large quantity of high velocity water emerging from the sluice gates and siphons, and also to reduce the erosive effect of the stream as it leaves the apron. At each end of the spillway section of the wall is a high training wall to protect the river banks in the vicinity of the dam.

The mass concrete wall is carried beyond the training walls and finally terminates as a cut-off wall in the embankments. These have been raised by widening on the downstream side and an impervious concrete apron, jointed to a cut-off wall, has been placed on its upstream side. To avoid danger of lifting of this apron during a rapid draw down of the water surface in the reservoir, it has been ballasted with a layer of stone covered with open jointed concrete slab work as a finish.

Constructional Difficulties

Construction was started in 1945 on a contract basis, and was eventually taken over in 1947, for completion departmentally. The spillway wall was first widened by stages up to the crest level of the existing wall and a period of some six months was allowed to elapse before further raising was continued over the top of the wall. Provision was made for draining the joint between the old and the new work, and a contraction joint constructed between each batch of three siphon openings. On opening out the flanks to widen the abutment walls, it was found that considerable seepage was occurring under the old foundations, and would be most troublesome to stop. As Mocke's Dam is a feeder to Mazelspoort dam below, it was decided to drain this seepage through the new work selected points and to permit it to find its way to Mazelspoort.

Much difficulty in the construction of the downstream protective works was occasioned by sharp floods which left a heavy layer of silt in their wake, entailing delay in having the area cleaned out.

The detailed work of constructing the siphon hoods proceeded regularly until completion in September of this year. Heightening of the sluice gates and the raising of their superstructures, with installation of new winding gear, was successfully accomplished before the advent of the last flood season.

Extensions to Mazelspoort Works

The works at Mazelspoort are at present capable of dealing with up to 4 million gallons of water per day. From an intake tower in the reservoir basin, near the dam water is pumped into large settling tanks, where, after treatment with coagulants, the water is allowed to stand and is then drawn off for final purification in pressure filters. From there it flows to a clear water reservoir and is pumped direct to the service reservoirs in Bloemfontein.

Under the proposed scheme of improvement, now in its initial stages, the first stage of extension of the works will provide for a capacity of 10 million gallons per day. New pumping plant will be installed and the pressure filters will be largely superseded by rapid gravity filters. The existing pumping station will undergo considerable alteration and extension in order to house this additional plant, while an additional clear water reservoir and new transformer house will be built. The settling tanks have been re-designed for constant flow and the chemical feed section of the works will be expanded and modernised.

Pumping Main

Between Mazelspoort and Bloemfontein the existing rising main comprises a 20-inch diameter steel bitumen-lined pumping main for the first half of the total of the thirteen miles. The second half of the thirteen miles comprises twin 12-inch cast iron pumping mains. The capacity of this main to deliver water from the present pumps at Mazelspoort is 3½ million gallons without a booster, 4 million gallons with the aid of the booster installed at the town boundary and 4.7 million gallons with pumps parallel at Mazelspoort and the booster in operation. This rising main has been re-designed and pipe deliveries have commenced and it will comprise a 30-inch diameter steel bitumen-lined pumping main for the first half of the length of the present 20-inch main. The first half of the present 20-inch main will be lifted, re-conditioned and laid parallel with the remaining half. The present twin 12-inch cast iron mains will be lifted and re-conditioned for use as trunk mains within the city's reticulation and replaced by a 30-inch main as before, through the new 10 million gallon reservoir now being constructed, as hereafter detailed. It is anticipated that this work will take from 2 to 2½ years.

Service Reservoir

The present service reservoir capacity approximates 4 million gallons. Messrs. French & Wolton Gray have under contract the erection of a service reservoir of 10 million gallons capacity and it is anticipated that the construction will be completed during the middle of this coming year. The reservoir is gravity wall section, circular on plan, and will be roofed. It is so situated and will be so controlled that it can backfeed to three other service reservoirs for the purpose of simplifying the pumping arrangements from Mazelspoort.

The phenolic moulding power plant at the new £22 million British chemical works, recently opened by Imperial Chemical Industries at Wilton, Yorkshire.

ABSTRACT FROM GOVERNMENT REGULATIONS

Municipalities of Edenvale and Lydenburg. — Building By-Laws Amendments. Transvaal Provincial Gazette, 19th October, 1949.
Administrator's Notice No. 659.

These amendments relate to signs on verandahs over streets, signs on walls, closet fees and the scale of general fees.

Township of Richmond — Building By-Laws. The Official Gazette of the Province of Natal, 20th October, 1949.

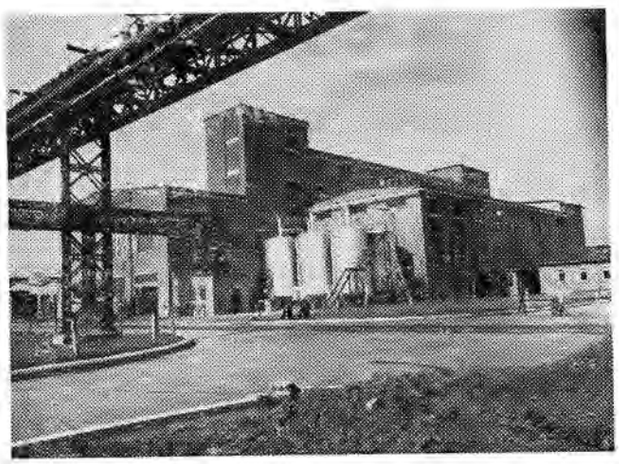
These by-laws cover some twenty pages of the Gazette, in the two official languages. They concern building plans, the structure of buildings, foundation and walls, open spaces, the number of conveniences required, encroachment on streets, protection of the public, public buildings, building fees and penalties. A schedule indicates the form in which application should be made for the approval of building plans.

Municipality of Riviersonderend — Septic Tank Regulations. Province of the Cape of Good Hope Official Gazette, 30th September, 1949. Provincial Administration Notice Number 444.

Apart from general regulations on this subject, the order sets out, in section 16, exactly how a septic tank shall be constructed so as to conform with the requirements. Details in regard to soakage drains are also given.

Divisional Council of Beaufort West — Regulations relating to building construction lines. Province of the Cape of Good Hope Official Gazette, 30th September, 1949. Provincial Administration Notice Number 438.

This regulation lays down that no person shall erect any building, wall, verandah, balcony, stoep or steps closer than 15 Cape Feet from the nearest boundary of any road or street.



AFRICAN REGIONAL SCIENTIFIC CONFERENCE

17th to 28th OCTOBER, 1949. JOHANNESBURG

CONVENED by the South African Council for Scientific and Industrial Research, this conference was attended not only by Union scientists but also by delegations from Great Britain, France and Portugal, as well as the African possessions of these powers. A wide variety of papers were read (some of which are summarised here), at an interesting series of plenary and sectional sessions. The broad division of subjects dealt with included physical environment, soils and plants, health and medical research, social research and technology.

If an opinion may be interpolated, which is fairly common to most of the papers, it seems certain that an immense series of problems awaits solution in Africa, that the fringe of these problems has hardly been touched as yet and that the machinery with which to do so is only beginning to function. At all points much work is required, large funds will be required and a wider understanding of both the problems and their urgency is necessary on the part, not only of governments but also the mass of the educated public, here and elsewhere in the continent. The scientists can point the way and indicate the directions along which research is needed but large sums of money, coupled with wholehearted co-operation, on the part of all concerned, are vital, if dividends on big scale are to be reaped. Patience is also essential for many of the problems, given all conceivable assistance will, in many cases, take years for their solution.

In his paper on **"Building Research and the Problems of Building in Tropical Africa,"** Mr. G. Anthony Atkinson, of the Department of Scientific and Industrial Research, Building Research Station, Watford, England, said :—

"This paper reviews some of the problems which face the builder in tropical Africa, attempts to assess their relative importance and suggests ways in which science can assist in their solution . . . .

The special features of life in tropical Africa which affect building most, are the climate and the relatively backward state of economic and social development . . . building in tropical Africa differs from that in a more temperate climate in four main ways :—

(a) Building materials and equipment behave differently. They are more liable to deterioration through the action of heat and humidity, mould growth, insect attack, etc. There is little or no risk of frost attack.

Generally, in the humid tropics, periods of strong sunshine alternate with the torrential rain. The problems of moisture penetration are, therefore, likely to be different. They are certainly very different in the dry tropics.

(b) The problems of thermal comfort are, obviously, very different. Allied physical problems like those of natural lighting are also different.

(c) Because of the relative backwardness of economic and social development, and because of differences in social organisation, building needs and the means by which they can be satisfied, are different. Generally speaking, buildings have to be simple and cheaper.

(d) In many parts of Africa there are few, if any, local building material industries. Building materials are made by handicraft methods, or have to be imported There are too few technicians and skilled artisans, and in many parts local training facilities are scanty. Also there are few experienced and well-equipped local contractors. In rural areas especially, builders are comparatively unskilled, or skilled only in traditional local techniques . . .

New British machine for building operations, designed primarily for excavating house footings.

Two basic tropical climates may be distinguished, the hot and humid and the hot and dry. Altitude, proximity to the sea, seasonal winds and rains will modify these basic types considerably.

The techniques of building in tropical Africa have developed, and are still developing, from two very different origins. There are first the traditional African techniques handed down from one generation of builders to the next; the fruits of hard experience, flavoured often with superstition. There are secondly the imported, mainly European, techniques which evolved under quite different circumstances, were applied to building in Africa with a varying degree of understanding and have been modified through practice . . . .

Behaviour of Materials and Equipment

Weather and climate act on materials in a variety of ways. High winds, lightning and earthquakes (for convenience included as a climatic influence) may cause major structural damage. Sun and rain, through alternate swelling and shrinkage of some sub-soils, for example, may cause damage to foundations. Rain may erode or dissolve materials, such as rammed earth or gypsum. High temperatures, or fairly rapid changes in temperature, may cause mechanical failure, they may also cause more rapid deterioration by speeding up chemical and bacterial activity, etc. High temperatures in conjunction with high humidities, especially in a chemically polluted atmosphere, result in a rapid increase in metallic corrosion. The action of mould growth and rotting is also noticeably speeded up. . . . .

Thermal Comfort and Allied Problems

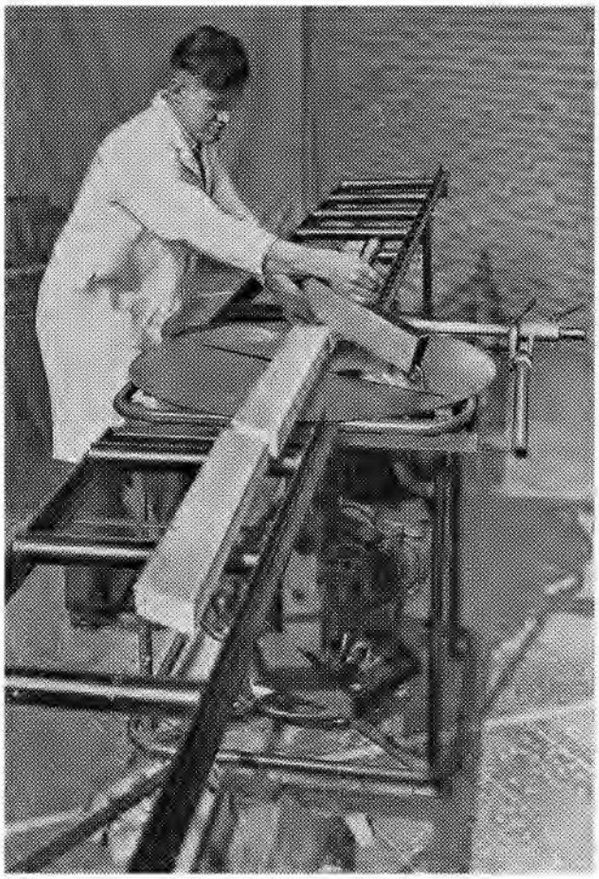
A building must not only be well built, but it must also permit the ready control of disease, be well ventilated and lit, and be thermally comfortable . . . .

Ventilation affects both health and comfort. A review of space and accommodation standards for low-cost housing, made recently at the Building Research Station, showed a wide variation in the statutory requirements for permanent ventilation in different Colonies. Preliminary observations of Dr. W. S. S. Ladell, who is carrying out a programme of research on hot-climate physiology in Nigeria for the Colonial Medical Research Committee, confirm the low rates of air-change common in West African houses, especially in sleeping quarters. For reasons of security and comfort, and sometimes superstition, windows are very often kept closed at night, and permanent ventilators blocked up . . . .

Until recently, there has been little co-ordinated scientific research on the design of buildings for hot climates . . . Most of the research work on hot-climate building design must be conducted in the field. Because of experience already gained and facilities available much of the work will probably be done in Australia and South Africa. The work which Dr. Roux is doing at the South African National Building Research Institute will be of great value to other African countries.

The Building Research Station has been engaged on a programme of full-scale house-heating research. This programme is being enlarged to . . . provide data for the study of summer cooling as well . . .

The problems of daylighting are very different in the tropics from those in Britain for two reasons: buildings have to protect people from the heat rather than the cold, and sky conditions are different. Daylighting is, perhaps, of secondary importance in housing design, but may be critical in schools, offices and suchlike buildings. In the dry tropics, relatively little light is diffused by the sky. The direct sunlighting of rooms is avoided and most of the light is reflected from the ground and surrounding structures. The problem is one of providing sufficient light while excluding heat. In the humid tropics, a hazy or cloud-covered sky may be the predominant source of light, and the problem is to reduce the glare caused by the contrast between the bright sky seen through a window and the comparatively dark interior of a room, especially the window wall. Most of the fundamental principles of natural lighting are known but **little is known about sky conditions in different parts of Africa.** This knowledge is necessary before the principles can be applied to particular lighting problems.



Power-saw recently exhibited at Tunbridge Wells in Kent. The rotating table top avoids the handling and turning of timber. Cuts at different angles can be made consecutively.

Building Needs and Means

It is not possible to discuss at length the social and economic aspects of building in tropical Africa. The major problem is, perhaps, to provide sufficient satisfactory low-cost housing for the rapidly growing urban African population, but the aim of this housing should be to create settled communities, not just to provide shelter. (At the same time, the countryside should not be neglected for the town). This means not only creating the physical background for a community —school, markets, health buildings and suchlike — a sense of participation and responsibility. This re-orientation, as yet perhaps not clearly expressed, can be seen, for example, in the Udi village development, Nigeria, and in Ernst May's plan for extending Kampala, Uganda. A host of problems

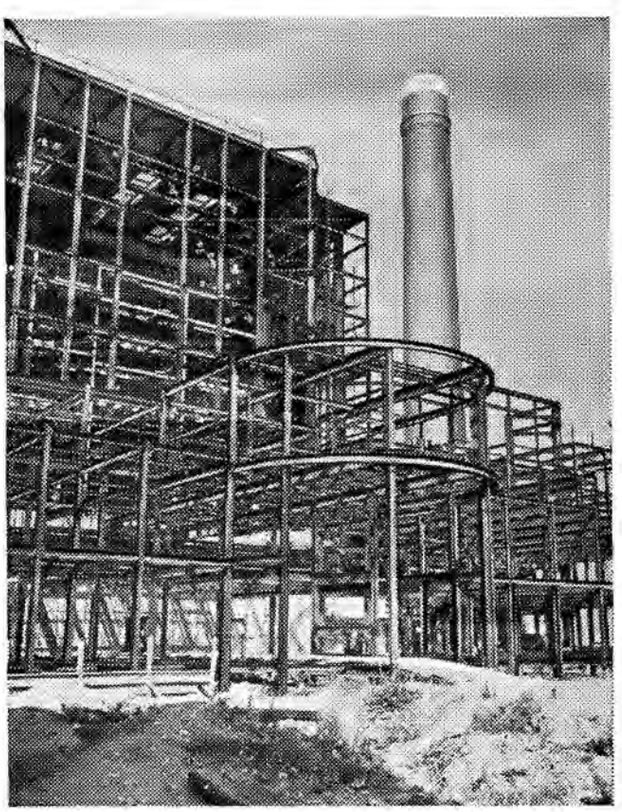
arise which need the co-operative study of such men as the administrator, health officer, and sociologist, as well as the builder and town-planner.

The public administration of low-cost housing in tropical Africa is in its infancy. New authorities . . . are being created to deal with the problem. Much has to be learnt about management and finance, as well as about design; the pooling, and critical analysis of experience is therefore most desirable. The wide variations in cost of housing, which was revealed in a recent Colonial Office survey, showed the need for more information about costs, both capital and operating, and for a common basis of comparison . . . much of the building work is by direct labour, and any elaborate costing system is impracticable.

Development of Building Materials Industries

The existence of a suitable clay for brick or tile making, of materials for cement making or fibres for building-board manufacture is not enough to ensure the establishment of a successful building material industry. Even where potentially most attractive sources of raw materials are to be found, the chance of successful exploitation is often slight. This is partly due to the size of Africa and to the relatively poor transport facilities to be found there. Building materials are generally bulky, and the market within an economic distance may well be inadequate to make manufacture profitable. The scarcity of cheap fuel and power, lack of skill among the local labour, and high initial overheads are other problems which have to be overcome.

The problems of developing successful building material industries are, therefore, often economic rather than technical.



A new £12 million super power station under construction at Waddon, near Croydon, in Surrey, England.

While some building materials — such as Portland cement — can only be produced on a large scale, and need expensive capital equipment and a large market, other materials — such as lime, gypsum products, burnt clay bricks and tiles, and precast concrete products — can be, and are, made on a much smaller scale. (The use of rammed earth in various forms, including pressed blocks, may, for convenience, be included among these). With the last materials it is often a matter of improving existing methods rather than inventing new ones. Yet it is here, perhaps, where work will be most immediately profitable. This is especially so where the equipment needed is simple — there is scope for development of such equipment — and where little or no fuel is needed in manufacture.

For this work, it is not sufficient merely to carry out experiments and tests in the laboratory, trials and practical demonstrations in the field will be essential.

Special Conference Needed

The development of a building industry depends, probably more than anything else, on an adequate supply of trained technicians and artisans.

The problem of making the results of building research known and applied is especially difficult in Africa where the range of technical knowledge and competency is so very wide. Building research must therefore be closely associated with practical development, and with technical education . . .

It would be useful if a specialist conference of building and housing problems was held in Africa. Probably, at the present state of development of African building, any such conference should be technical rather than scientific, though the problems of research should form a substantial part of its proceedings.

In their joint paper Messrs. J. E. Jennings and A. J. A. Roux, both of the National Building Research Institute, C.S.I.R., Pretoria, and Mr. P. H. Connell, of the University of Natal, dealt with **"Housing in Hot Climates."**

The authors made the following points:—

Housing practices in any region are usually dictated by five dominant, and frequently interrelated, factors: these are the climate of the area; the geology, which is considered to include both rock and soil types; the social conditions of the people and their degree of technical proficiency; and finally, the economic wealth of the region . . . .

The climates in Africa may be divided into three broad classifications, each of which produces special building problems. In the equatorial belt and along the East and West coasts the climate, which may be defined as "equatorial" is characterised by relatively constant and uniformly high temperature, humidity and insolation. Over the inland plateau, south of the equator, where the climate may be called "hot, high altitude" large diurnal and seasonal changes in air temperature are encountered; humidity is relatively low and insolation remains generally high throughout the year. The third climate is to be found in the desert areas of North and South Africa, where conditions similar to the "hot high altitude" are found, except that the diurnal and season temperature ranges are much greater and humidities considerably lower.

It can be seen that high air temperature and high intensity of solar radiation are factors common to all three of these broad climatic divisions. In comparison with more developed

areas in the Northern Hemisphere, the temperatures are 20 to 30°F. higher and insolation is two to three times as great. These factors give rise to special building problems . . . the solution can only be provided by research in these areas themselves . . . . The research problems associated with high temperatures and high insolation may be divided into three groups: comfort considerations, dealing with the effects of these climatic factors on the human body and with measures to promote physical well-being; economic factors, which deal mainly with the problems confronting the builder and engineer; and finally, **design, which covers the field of the architect** and the efforts made to put into practice the findings of the engineer, physicist, chemist and other related scientists.

Comfort Considerations

Problems of human comfort are generally associated with "summer cooling" rather than with "winter heating." . . . the human body produces a definite amount of heat and the environment must be such that this heat is dissipated at such a rate as to maintain normal body temperature. The human body is remarkably adaptable and this fact permits a fairly broad zone of comfort, allowing quite considerable variations in the environment. There are four conditions in the environment which control the rate of heat loss; these are the air temperature, humidity, air movement and the mean radiant temperature of the surroundings. The relative importance of these factors depends on the building procedures designed to control them as well as the climate; in this regard it has already been shown that the panel radiation effects of the building components are the principal cause of discomfort experienced in certain types of house construction in Africa. Research work is already in hand to establish comfort zones for South African conditions: it is known that the comfort conditions change somewhat with season, type of clothing worn and activity and it is probable that they will also differ with different stages of acclimatization and with different races . . . .

A notable series of experiments using an elaborate heat transmission test room exposed to actual outdoor conditions, is at present being conducted by the National Building Research Institute in Pretoria. An attempt is being made to relate the heat flow with the outdoor climatological conditions of air temperature, solar radiation and wind, and with the physical and thermal properties of the building components, e.g. conductivity, specific heat, density, absorbtivity for solar radiation and film co-efficients. A theory for periodic heat flow in terms of these factors is now well advanced and tests are being carried out to establish the validity of the theory under actual conditions of exposure. It is expected that this work will assist considerably in defining the limits to which those factors affecting human comfort can be economically controlled and also in assessing the relative values of various types of construction.

Due consideration must be given to climatic factors in designing for human comfort. Those to be taken into account are the dry and wet bulb temperatures, the solar radiation intensity, the wind direction and velocity, and rainfall. . . it is suggested that a common procedure for tabulating these factors and recording them in a form suitable for the quick assessment of the conditions for which buildings should be designed, could be undertaken by all countries in which these factors are of primary importance.

A subject of particular importance to housing in hot climates is the ventilation rate in a building. Air movements can be relatively easily controlled and, providing the air temperature is not excessively high, much benefit can be derived by making use of natural ventilation to carry away the moist air surrounding the occupants, with a consequent improvement in the sensation of comfort. Much can also be done by the judicious use of the thermal characteristics of the building itself. Cold air can be introduced during the night to reduce the temperature of the walls and other internal constructions: this will have the effect of cooling down the hot air which enters during the following day and will result in considerable benefit.

Economic Factors

Experiments are at present in progress relating to the use of solar energy for the heating of domestic water. The method is quite feasible but the problem lies in producing a unit which will compete economically with other methods of hot water supply.

It has been observed that many paint films used in house construction to-day are breaking down within six months after application and efforts are being made to ascertain the causes of and remedies for this unsatisfactory position. It is thought that the trouble is associated with severe climatic exposure, and at the same time pre-treatment of the surfaces and methods of application are receiving attention. A similar condition applies in the case of exposed bituminous surfaces and here practice has evolved certain procedures for shielding the materials from the weather. These practices have considerably reduced the breakdown period but the condition is still far from satisfactory . . .

Verminproofing of Buildings

The warm climates of Africa provide an ideal environment for fungi, wood-destroying insects and other verminous insects in buildings.

Termites take a heavy toll of our building timbers every year, one estimate stating one in three houses on the Witwatersrand to be infested . . . Termite proofing measures to be applied during the construction stage have now been evolved and are being widely adopted in South Africa . . .

Co-ordinated research is of the greatest importance in approaching these problems . . .

A nucleus of this work exists in the South African Termite-Proofing Committee whose work could be extended to cover a wider field.

Effects of Arid Climates on Foundation Soils

It has been found that buildings erected on some fairly widely distributed clay soils have shown a tendency to rise instead of settle after construction. These buildings are often subject to severe cracking, the cracking in some areas being so severe that, unless a satisfactory foundation can be evolved, the whole method of construction in rigid brickwork may become uneconomic. The soils concerned usually exhibit a very fractured texture which is considered to indicate seasonal movements inside the mass of the soil.

Two interesting researches are being pursued: the first involves the study of the transfer of moisture towards the centre of the building on the hypothesis that the coverage of the building interferes with the solar radiation to the soil and consequently creates a cold region under the centre of the building; records show a mean soil temperature 5°F. higher than the main air temperature. The second investigation

involves the use of anchor piles carried down to below the zone of moisture change.

This problem is being encountered over a wide area in Southern Africa and it is most probable that it also extends to other areas further North . . . .

Design Factors

It is most important in the planning of houses in hot climates to avoid an impression of confinement under oppressively hot conditions. This is in direct opposition to the feeling of "cosiness" desired in cold climates . . . Improvement can be effected by the use of large glazed areas which provide a visual link with the landscape outside although care may have to be taken to protect such glazed areas from excessive sunshine; clean untrammelled walls with light colourings will also assist and care should be taken to avoid sharp contrasts in lighting . . . .

Much is being achieved by architects who are taking advantage of climate to induce the householder to conduct more of his living functions out-of-doors, as on terraces and stoeps. This is a distinct trend in modern house architecture on the highveld of the Union of South Africa and deserves further study . . . .

Considerable advantage can be gained, both in winter and summer, by the design of buildings to allow or exclude sunshine according to the seasonal requirements of heat. Architectural devices such as canopies and well designed eaves can assist in shading buildings during hot summer months and drawing board and heliodon studies can help in attaining these conditions. Charts for use in calculating sun penetration are being developed for South Africa and these could be adjusted for use in any part of the continent.

Ventilation requirements in buildings have received considerable thought, the trend being towards an elongated plan which allows cross ventilation. To make full use of natural winds the buildings in the housing estate should be sited so as to make the maximum use of prevailing air movements.

It is important to segregate the hot spots in a house and permanent fires, such as cookers and slow combustion stoves, should be placed so as to avoid adding unwanted radiant heat sources on inside walls. An effort is also being made to protect buildings from solar radiation; wide eaves can be made to shade walls, and massive construction can serve to retard the flow of heat and reduce the heat gained by the interior during the hottest part of the day. Attention is being given to the roof ceiling combination which, due to its aspect, is generally most favourably situated to receive the maximum amount of solar radiation. An effort should be made to provide a thermally balanced construction and the walls and roof should be so constructed as to provide equal protection against heat gain. By selecting highly reflective surfaces, roof paints and wall finishes can serve to reduce the amount of solar radiation received . . .

It is common experience that designers take account of local factors in so far as they affect the more obvious economics of building but in other matters which affect the fundamental conceptions of design, one frequently finds an adherence to European and American practice which indicates a lack of appreciation of the local conditions involved . . .

There is much work that still remains to be done and the general economic condition of the peoples in Africa is such that the use of the more expensive and elaborate procedures is generally precluded. The relatively low purchasing power of the great bulk of the inhabitants must always be borne in mind as a paramount external factor; dwellings must be small and economically planned and a compromise between the ideal and the possible is an ever-present consideration . . .

Timber Utilisation

In his paper on **"Timber Investigations in the Union of South Africa,"** Mr. M. H. Scott, of the Forestry Products Research Institute, referred to the fact that this organisation was the only one of its kind on the African continent. As a result of many years of experiments, a standard work on timber seasoning in South Africa, also applicable to most African territories, has been published in bulletin form.

In the direction of timber utilisation pioneer work at the Institute has found that the young eucalypt species can be widely employed for flooring and other purposes. Work on timber preservation has been expanded to include treatment of a wide range of products, including squared timber, joinery and floor blocks, not only against termites but also against wood boring insects. Following a study of the normal pentachlorophenol preservatives, the development of a non-oily, quick-drying and non-blooming type is one of the latest successes. This preservative, which has high penetrating properties, may be used in the form of a soaking treatment with many pine species and, with very low pressure, with hardwoods. This disadvantage of sludging which occurs in some oil creosote mixtures, when used as wood preservatives, has also been eliminated in some cases, by means of the addition of an aromatic "bridging agent," thus greatly improving penetration and absorption.

There are few, if any, trained full-time forest products research workers in other African territories. At present the main limitation to fuller co-operation with them is the staff position at the Institute. But there would seem to be no good reason why it should not continue to serve Africa generally as far as it lies within its power.

Using Coal Wisely

In a discussion on "Research on Coal Utilisation in Africa," Dr. A. J. Petrick, Director of the Fuel Research Institute, Pretoria, and nine collaborators, advanced the view that "Research on coal-burning appliances using African coals is overdue. Large concerns in South Africa have paid considerable attention to design, bearing in mind the quality of coal available, but smaller plant has been imported without due consideration of this important factor. The result has been that in many cases maximum efficiency has not been attained.

"Boiler plant work needs to be done at practically full scale and is therefore rather expensive. Co-operation of industry is very desirable so that the experimental unit may be usefully employed. **In the field of domestic appliances, very useful work could be done, as the efficiency in this field is very low.** Considerable progress has been made in other countries and to a large extent this knowledge can be applied in Africa."

In the preceding part of their paper the joint authors recall the difficulty of transportation, the comparatively poor quality of the coals, the scarcity of coking coals, the total absence of natural petroleum and the scarcity of water, which, apart from its obvious advantages as a means of generating electricity and as a method of transport, is also needed to wash coals and to process them for conversion into synthetic oil.

Water Resources

An interesting series of papers was devoted to the vital question of water. In his summary Mr. L. A. Mackenzie, Director of the Department of Irrigation of the Union Government, stated "Water is the limiting factor to development in most parts of the Union . . . research is practically confined to that undertaken by the Union Irrigation Department which at the moment is concentrating on a country-wide survey of surface water resources. This survey will be published, if possible, next year . . ."

Towards the end of his paper, Mr. Mackenzie made the following further points. "The degree to which the Union is handicapped by lack of long term records of variable natural phenomena has been implied — a handicap which is probably applicable to most African States south of the Sahara . . . . Attention has been drawn to the severe handicaps to water development imposed by the Union's water laws and, as a first step in overcoming the obstacles, the complementary advantages offered by the regional organisation of public enthusiasm for scientifically planned resource utilisation are outlined. Paucity of surface water resources in most parts of the Union demands multi-purpose use wherever feasible and some sort of regional organisation is consequently necessary to ensure that inter-related factors are taken fully into consideration and conflicting interests reconciled."

Other papers relating to this subject so vital, not only to the Union but also to all other parts of the African continent, included **"The Occurrence, Location and Exploitation of Underground Water in South Africa"** by L. T. Nel and H. F. Frommurze, of the Geological Survey, Union of South Africa. **"Treatment and Disposal of Industrial Effluents in Relation to Water Supplies"** by H. Wilson and W. S. Rapson, of the National Chemical Research Laboratory, C.S.I.R., Pretoria. **"The Water Cycle as affected by Land Use,"** by R. R. Staples, of the Department of Agriculture, Southern Rhodesia, and **"A Short Note on Hydrographic Research."** In this last paper, by H. W. H. Wallis, of the Irrigation Department, Southern Rhodesia, the author stresses the need for long period collection of records of river flow, catchment yields and research into the general behaviour of water from its occurrence as rain; the need for planned regional surveys of river catchments and the assessment of the ultimate limits of the water resources of regions or zones comprising individual catchments or groups of catchments; the standardisation of methods of observation and analysis of records; inter-territorial co-operation, particularly on catchments of common or boundary rivers and the interchange and publication of results of records and research.

Soil Problems

Allied to these highly important water problems, naturally, were another group of papers dealing with soil conservation and research. While such problems are more commonly regarded as the sphere of the farmer and agricultural scientists, they must necessarily interest town planners and others, to whom is entrusted the task of deciding where building development shall occur. If towns are planned in places, to take an extreme case, where the inhabitants have no source of food to draw upon, because the surrounding country is infertile, then obviously much harm will be done. The papers in this group, whose names and authors appear here, are consequently, of interest to architects, even if only indirectly.

Among these valuable contributions to an extremely important subject were the papers read by Dr. J. C. Ross on **"Soil Conservation in Africa, with special reference to the Goma Conference"**, by John Phillips on **"Some Soil and Conservation Problems of Africa-wide Significance,** by B. S. Ellis on **"The Organisation of Research into, and Standardisation of methods, nomenclature, and interpretation in soil classification." "Soil Classification, Mapping and Soil Survey in Southern Africa,"** by C. R. van der Merwe, **"Brak and Soil Improvement,"** by H. Klintworth.

Population Research

Yet another group of papers dealt with the general subject, chosen as the title of Dr. H. S. Gear's paper on **"The Influence of the Physical Environment of Africa on the Health of its Human Population."** Some of the questions postulated by Dr. Gear deserves careful study for they are basic to many problems of human relations within the continent. He asks: "Does the African environment with its tropical and near-tropical climate, foretell fundamental change in the populations who enter it from elsewhere? Are the populations of Africa capable of rising to the supreme heights of human endeavour with or without artificial assistance from air conditioning and similar devices? Does continuous exposure of successive generations to tropical sun, light and humidity reduce physical, mental and racial vigour? Does it cause such pathological entities as tropical neurasthenia, skin cancer, loss of fertility, and metabolic disturbances of calcium and other constituents?"

Special telephone boxes installed on the Thames embankment in London, with full dialling instructions in Italian, Spanish, French and German, for overseas visitors.

In a combined paper, by Dr. E. H. Cluver, of the South African Institute for Medical Research, and Mr. E. Jokl, of the Union Department of Education, the authors say : "About 100,000,000 people of indigenous African stock live south of the Sahara. The potentially invaluable reservoir of manpower in Africa is distinguished by a high physiological labour capacity and by low standards of work efficiency caused by continuous losses of 'adaptation energy.' The main causes of these losses are the high rates of birth and of infant mortality ; endemic and epidemic illnesses ; deficiencies such as of clothing and housing ; malnutrition ; and superstition.

"It is suggested that an African institute for population research should be established with a view to preparing data on which a progressive policy could be based in order to improve working efficiency. The first task of such an institute should be the organisation of a comprehensive and detailed population census."

Industrial Investigations

Among papers dealing with material and industrial research was one by Messrs. S. G. Shuttleworth, G. M. Dreosti, L. Whitby and K. Douwes-Dekker on **"Industrial Research Associations in South Africa."** This outlined, *inter alia,* the work of the Paint Industries Research Institute. This organisation, which only began to function in December last year, is still only in the stage of having its laboratories built. But its programme includes both fundamental and *ad hoc* research into problems affecting the interests of both manufacturers and users of paint and allied materials. This investigation and evaluation of indigenous raw materials of potential value to the Paint and Plastic Industry will occupy a substantial proportion of its activities. It will provide expert advice and information on matters within its scope and, under special arrangements, will undertake experimental work on raw or semi-processed materials. Two papers, by Philip Rabone and J. Levin, of the Government Metallurgical Laboratory, Witwatersrand University, and by T. J. W. Jorden, of the South African Iron and Steel Industrial Corporation, Ltd., respectively, discussed **"Metallurgical Research Facilities in the Union of South Africa"** and **"The Utilisation of Raw Material in the Ferrous Metallurgical Industry in the Union of South Africa."**

Traffic Engineering

Colonel W. F. McLaren communicated a paper by the staff of the Division of Civil Engineering, Department of Transport, Union Government, on **"Road Planning and Construction in Africa."** On traffic engineering and safety the authors stated : "Little is known of this matter at present, and research into *what* to study seems at least as necessary as the study of any particular aspect.

"On the engineering side, it seems probable that the promotion of smooth traffic flow by the elimination of blind spots, surprises, bottlenecks, points of congestion and traffic conflict and mentally confusing places, and the provision of convenient parking where it will not interfere with moving traffic, are the most hopeful lines of attack. It is certain that the mere plastering of the countryside and towns with prohibitory signs will have no beneficial effect, except on the revenue from fines . . . the most effective way to prevent accidents is to build safety into the road."

Aerial Surveys

Two papers with most suggestive titles were **"The Use of Air Photographs and Air Survey for Scientific Purposes in Africa"** and **"The Need for Special Maps of Sub-Regions of Africa, giving detailed Information necessary for Scientific Assessment and the Planning of Developments."** These were delivered by H. A. Baumann and N. G. Huntly, of the Trigonometrical and Topographical Survey of the the Union of South Africa, and by W. G. Sutton, of the Witwatersrand University, with S. J. de Swardt, of the Department of Agriculture, Pretoria.

In the former paper the authors remark that "Governments in the past seem to have regarded air photography and air survey as being justified only when required for some specific task such as the construction of a railway line or a dam, or the geological survey of a certain area of interest. Air photography and air survey now form the basis of many types of research leading to an increased knowledge of the natural resources of a country and to improvements in the utilisation of these resources."

Among the maps suggested in the latter paper are :—

"(a) A rough classification of soils ;

(b) the approximate distribution of plants which have been found to be important indicators of climate and of the possibilities of economic crops (both agricultural and forest) ;

(c) a distribution of the insects which have been found to be associated with the potentialities and limitations of settlement and farming (the pests to be combated, such as malaria, nagana, tickborne diseases, plant pests, etc.)

(d) a rough classification of the area into sub-divisions from the point of view of their anticipated value for agricultural and forestry uses (including an estimate of carrying capacity for different kinds of livestock, watering facilities)."

No doubt, architects will be able to think of special maps of this nature which would be of value to them in the exercise of their profession.

There were, of course, a number of other papers read at this most valuable conference. But those which, in our opinion, were of most interest to readers have been summarised or mentioned here. It is understood that, shortly, printed and bound copies of all the papers will be available for purchase by those who are especially interested.

BRICKS AND CEMENT PRODUCTION

In the August number of the Monthly Bulletin of Statistics, just published, there are figures relating to the production, *inter alia,* of these two commodities.

Taking 1936 as 100, the index figure for brick production in July, 1949, was 144.1. This is 7 less than the figure for 1948 and nearly 18 lower than for the month of March this year.

Cement production for July, 1949, just topped 127,000 short tons, compared with less than 64,500 tons in 1936. The July figure, this year, is, however, not quite an all time "high," for it was exceeded by nearly three hundred tons in the same month last year. The index figure for July, 1949, is 197.1, as compared with 135.2 ten years ago. During the past decade, therefore, cement production in this country has increased by some 40,000 tons monthly.

PUBLICATIONS RECEIVED

Reinforced Concrete, by A. L. Baker. Published by Concrete Publications, Ltd., 14, Dartmouth Street, London, S.W.1, 295 pp. 16s., postage included.

The author of this book is Professor of Concrete technology at the Imperial College of Science and Technology in London. In his preface he says: "This book has been written for students and engineers who wish to learn the theory and practice of reinforced concrete. It has been assumed that the reader is familiar with the elementary theory of structures, but the more advanced analysis of indeterminate structures has been included. The fundamental theory of the stresses in reinforced concrete based on stress-strain relations as commonly accepted, with suitable margins of safety, has been presented and also extended to simplified forms so that students may not only learn to base calculations on established theory but become accustomed to developing methods of design which will enable him to evolve and select the best solution of a practical problem."

There are ten chapters and three appendices. All are profusely illustrated by diagrams, graphs and photographs. In the first six chapters the principles of design, the theory of statically indeterminate structures, beams and slabs, columns and struts, secondary effects and pre-stressed concrete are dealt with. The last four chapters cover design practice, estimating, costing and progress charts, concrete construction and commercial practice. In the appendices are to be found design data, calculations for slabs, beams and columns, as well as the plastic theory of concrete.

The chapter on design practice, which covers 46 pages, deals with not only buildings but also bridges, tanks and bins, retaining walls and dams, underground structures, jetties, wharves, foundations and joints. There are also sections giving formulae and means of checking calculations and drawings. The whole work, which is well printed and produced, is rounded off by an index.

South African Who's Who, 1949. Published by Ken. Donaldson (Pty.), Ltd. 751 pp. Price: Four guineas.

This thirty-third edition has, in the words of the editor, been "townised," in response to many requests. Consequently, the careers and photographs of the leading personalities in the Union are to be found under the names of the towns in which they are domiciled. At the same time there is a general index for the reader who is not sure of the place where any particular individual lives. Although the editor, who is now in his eighty-fifth year and is retiring in favour of his son, apologises for the late appearance of the work, partly caused by a change of printer, the volume is as well produced as its predecessors. The guide to officials in the early part of the book is not by any means the least valuable portion. While many of the biographies are as full as could be wished, some are slightly laconic, but that, perhaps, is the fault of the people concerned, whose natural modesty has prevented them from giving further details about themselves, details which other readers would doubtless have much appreciated.

There is no doubt, however, that this work comprises an extremely useful book of reference which should find a place on most bookshelves.

Electrical Equipment Safety Specification for Fixed Electric Water Heaters. Published by the South African Bureau of Standards. 30 pp., English and Afrikaans. Price 5s., post free.

This specification forms one of a series, which is being drawn up to establish minimum safety standards for electrical equipment. Since its purpose is confined to safety aspects other quality requirements, which do not concern safety, are not included.

The desirability of establishing a series of safety specifications was first suggested by the electrical industry itself. It is known that dangerous or potentially dangerous appliances are sometimes marketed, exposing users to risks from which they should be protected. Eventually it is the intention to recommend to the Minister of Economic Affairs that the whole series of specifications shall be declared compulsory, so that no electrical appliance, falling within their scope, may be sold within the Union unless it complies with the relevant safety specification.

Among other matters dealt with in the specification are the enclosure of elements and other live parts, the method of connection to the water system, the electrical connections and the earthing facilities. Any one concerned with the design and installation of electric water heating systems would be well advised to obtain a copy of this specification.

Specifications for Ferro-Manganese, Silico-Ferro-Manganese, Ferro-Silicon and Ferro-Chromium. Published by the South African Bureau of Standards. 80 pp. 5s.

In a foreword, it is stated that these specifications are mainly based on those of the American Society for Testing Materials. They have, however, been adapted to suit local conditions.

Annual Report of the Commissioner of the South African Police, 1948. Published by the Government Printer, Pretoria. 16 pp. 3s.

This report shows that, at the end of the year reviewed, the Union Police Force was over 3,000 men under establishment. Among the reasons listed for men leaving the service is unsuitability of accommodation. But the main reasons given are better prospects elsewhere, desire to engage in farming, no interest in the Force, wish to engage in private business, to avoid dismissal or conviction, to get married or to take up studies. But, as the report states, "it can, without doubt, be assumed that the primary reason is the difference in pay as compared with outside employment." The majority of men leaving do so during the first three years of their service, but after the third year wastage rates are normal.

With regard to accommodation the report says: "A number of the quarters provided are out of date and far below modern standards . . . This applies not only to living quarters, but also to the buildings in which the men are expected to do

their work. A large number of these are very old and in dilapidated condition . . .

"The Department's long term major works programme now comprises 544 services, representing a list of police stations, both Government-owned and hired, which require to be replaced by new State-owned buildings . . . The schedule has since the previous year increased by more than a hundred services . . . For the Department to function efficiently and to meet the evergrowing demand for police protection, it is imperative that the erection of buildings at those centres for which financial provision has been made on the estimates should be considerably accelerated . . ."

There is a good deal more in this strain, in this report, which those interested would do well to study. There is no doubt, however, that the lack of suitable buildings is at present seriously hampering the efficiency of the Force in more ways than one. The rest of the report deals with the types of crime dealt with. In this connection it is worth remarking that nearly 1,100,000 persons were prosecuted during 1948. This means that almost one person out of every ten in the Union was charged with some crime or other during the course of that year.

NATAL DRAFT ORDINANCE

In the Official Gazette of the Province of Natal, dated 1st October, 1949, there is a draft ordinance to "consolidate and amend the law relating to the establishment of private townships, the sub-division and lay-out of land for building purposes or urban settlement and the preparation and carrying out of town planning schemes; and to provide for other incidental matters."

The draft ordinance proposes the establishment of a Town and Regional Planning Commission, whose functions are set out, under 10 heads, in section 5. Among the most important functions envisaged is the giving of advice to the Administrator in matters relating to the establishment of private township schemes, the determination as to whether any private township, which is proposed, is in the public interest and to formulate, in general terms, a town planning policy for the province. The last function would have special reference to various types of development in relation to roads, railways, residential, commercial and industrial areas, educational and other public institutions, commonages, places of recreation, open spaces, water supply, sanitation, soil suitability and the like. The Commission would also be expected to undertake regional surveys and to prepare plans based upon those surveys.

Among the powers to be granted to the Commission are those of acquiring by purchase, lease or otherwise, land and other property of any description and to construct and maintain, alter or improve buildings. It may also enter into contracts. At the same time it is expressly laid down that the exercise of any of these powers shall be subject to the prior approval of the Administrator.

In addition to the Commision there is also to be established a Townships Board, which shall administer the detailed work of establishing private townships. The functions, powers and duties of this board are set out in Chapter III of the draft ordinance. The fourth chapter concerns the procedure to be followed in relation to town planning. Following the final chapter on fees, vesting of the ownership of public places, penalties, regulations, fines and so forth, there is a schedule setting out the matters to be dealt with by schemes. While the first 18 are entirely reasonable, it is worth noting that the last "matter," number 19, asks for "Any other matter *or* thing provided in the Ordinance *or reasonably incidental* thereto or to a matter hereinbefore mentioned." The operative word, in this clause, presumably, is *"reasonably."* Otherwise it lays the promoter of the scheme open to the need for providing or doing quite a number of things which *he* may not consider necessary.

PROGRESS OF STEEL INDUSTRY.

The phenomenal development of the iron and steel industry in South Africa may be gauged from the fact that last year Iscor's production of ingot steel reached something over 615,000 tons. When the extensions at present in hand are completed, both at the Iron Ore Mine, at Thabazimbi, at the Pretoria works, and at Vanderbijl Park, the total ingot production will be in the vicinity of one million tons per annum.

During the first year in 1934, Iscor employed 1,635 Europeans and 1,174 Natives. When the new extensions are in operation the number of employees will be approximately 7,100 Europeans and 9,700 Natives. These figures include all the Natives in the ore mines and dolomite quarries.

The total ingot tonnage produced up to date is over six million tons. By the end of June, 1948 (the latest date for which published accounts are available) Iscor has supplied the country with products to a total value of £67,500,000. Of this amount income tax absorbed something over £2,000,000, while railage bills to the South African Railways amounted to just about £6,000,000. Wages and salaries accounted for about £24,500,000.

WATER BORING OPERATIONS INCREASE

Since 1945 not only has the Union produced its own boring machines, but the shortage of trained drillers, hitherto a limiting factor in the activities of the Irrigation Department, has partially been solved, mainly as a result of a country-wide publicity campaign.

While in 1941-42 for example, there were only 80 boring machines in use by the Department, the present total is over 200. The number of applications for drilling in 1946-47 was about 2,600, while the present figure is 8,314. This substantial increase must be attributed mainly to the drought conditions affecting the country in the past two years, as well as the diminution of underground water. Activities in drought-stricken areas receive the special attention of the Department in its attempt to alleviate the position.

The drilling section of the Department has a vital interest in underground water resources, and for more than thirty years has undertaken boring operations for farmers, it is stated.

In order to meet the stock farmers in drought-stricken areas in the low rainfall regions of the North-west Cape, Transvaal and other districts, a new arrangement of "no water, no pay," has been instituted. If the water yield is less than 60 gallons an hour the borehole is regarded as dry and no payment is demanded.

The Department states that there is at present such a large stream of applications for drilling, that it is impossible to cope with them all. Between 400 and 600 private boring contractors are in the field.

BIG ARGENTINE PUBLIC WORKS PLAN

The Provincial Government of Catamarca, Argentina, has passed a law sanctioning expenditure totalling 330 million pesos for public works. This sum will include :

	Millions of pesos.
Water	60
Hydro-electric works	73
Transport	5.5
Roads	43
Aerodromes	2.5
Industrial Development	23
Housing	5
Public Buildings	24

It is likely that calls for tenders for long term contracts will be announced for the public works envisaged.

Highways, Bridges and Aerodromes.

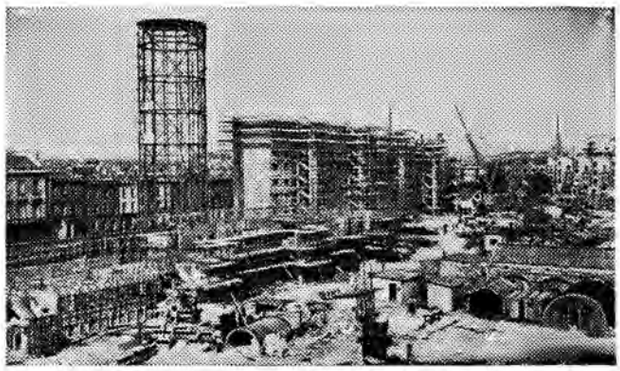
BUILDING RESEARCH IN UNITED KINGDOM

A large part of South Eastern England is covered by a firm, shrinkable clay. This clay has adequate load bearing strength but it dries and shrinks in summer and swells in winter. In such ground shallow foundations for a building are dangerous for the clay shrinks away from the footings during the warm dry weather, the foundations settle unevenly and the walls crack. Thousands of buildings have suffered in this way, sometimes nearly every house in a street being affected. Repair is always difficult and costly, and further damage may often occur.

An obvious way of avoiding trouble is to make the foundations at least three feet six inches deep for, at this depth, movement due to shrinkage is very slight. But deep foundations are expensive and cheaper solutions are being sought.

Britain's Building Research Station, in collaboration with the Ministry of Works, has been examining the possibilities of short bored piles as an alternative method of providing safe foundations. Holes are bored in the clay by hand or mechanical auger to a depth of eight feet or more, and are filled with concrete, forming piles which may be spanned by floor slabs, or by precast or cast-in-situ reinforced concrete beams. The spacing and size of piles depend on the site plan, the load to be carried, and the soil strength.

Such foundations have already been used. At two schools, one at East Barnet and one at Chigwell, the Building Research Station and the Ministry of Works have co-operated with the authorities concerned in the study of the problems involved. The method has been shown to be practicable and capable of saving both manpower and material.



Exhaust heat, from the Battersea Power Station, will be used to warm this block of flats in a Pimlico Housing Estate, at Westminster.

LIBRARY ACCESSIONS

C.S.I.R. Information, in its present form, is a list of accessions to the Library and Information Division of the South African Council for Scientific and Industrial Research. Many of the publications listed were received from the Union's Scientific Liaison Offices in London and Washington.

The arrangement of the accessions list is alphabetical under subject headings. As far as practicable these headings have been kept uniform with those used in the **Industrial Arts Index,** a publication familiar to most searchers for technical information. The classification numbers follow the Universal Decimal Classification. Short annotations or abstracts have been added when the titles are not self-explanatory. Certain documents have already been handed on to institutions which have built up collections covering highly specialised fields. In such cases the name of the institution is given in this list, as the document in question is located there. Applications to borrow such items should be sent direct to the institute named, not to the C.S.I.R. Library.

Publications not in constant use by the departments of the C.S.I.R. may be borrowed through the post. **Enquirers should quote the number at the left-hand side of each item (e.g., 35 21)** and address their letters to : Library and Information Division, South African Council for Scientific and Industrial Research, P.O. Box 395, Pretoria. Telephone : 3-1261 (Ext. 42).

Documents should be returned to the Library by **registered post, packed flat.**

ALUMINIUM

37/5 BUDGEN, N. F.

Aluminium and its alloys . . . second edition. London, Sir Isaac Pitman and Sons, Ltd., 1947.

ix, 369 p. fornt., photos, maps (folding), tables, diagrs. **Main sections:** Production and properties of aluminium. Melting, casting, working, welding, corrosion and industrial applications of aluminium alloys.

669.71

ALUMINIUM Alloy Castings

37/6 BRITISH Standards Institution, London.
. . . . British standard specification for silicon aluminium alloy castings for general engineering purposes . . .
London, British Standards Institution, 1936. (British standard No. 702 — 1936).
10 p. diagr.
(In National Chemical Research Laboratory).
Pam. 669.715.782 : 389.6

ALUMINIUM Alloys, Wrought

37/8 BRITISH Standards Institution, London.
. . . Wrought light aluminium alloy sheets and strips for general engineering purposes (specific gravity not greater than 2.85) . . . London, British Standards Institution, 1930. (British standard specification 395-1930).
7 p. tables. Duplicated.
This specification covers the alloy generally known as Duralumin.
(In National Chemical Research Laboratory).
Pam. 669.715-41 : 389.6

ANGLE Bars

37/10 BRITISH Standards Institution, London.
. . . Dimensions and properties of British standard equal angles, unequal angles and T bars for structural purposes (revised April, 1934). London, British Standards Institution, 1934. No. 4A — 1934).
24 p. tables, diagrs.
(In National Chemical Research Laboratory).
Pam. 624.04 : 669.14-423 : 389.6

BOILER Tubes

37/19 BRITISH Standards Institution, London.
. . . British standard specification for hot finished weldless steel boiler and superheater tubes for designed steam temperatures not exceeding 850°F. London, British Standards Institution, 1934 (British standard No. 512-1934).
7 p. tables.
(In National Chemical Research Laboratory).
Pam. 621.181-462 : 669.14-462 : 389.6

BOILERS. Equipment

37/20 BRITISH Standards Institution, London.
. . . British standard specification for valves, gauges and similar fittings for land boiler installations . . . London, British Standards Institution, 1937. (British Standard No. 759-1937).
24 p. tables, diagrs.
(In National Chemical Research Laboratory).
Pam. 621.183 : 389.6

37/21 BRITISH Standards Institution, London.
. . . Ferrous pipes and piping installations for and in connection with land boilers. London, British Standards Institution, 1942. (British Standards Institution, 1942. (British Standard 806 : 1942).
54p. tables, diagrs.
(In National Chemical Research Laboratory).
Pam. 621.18-462 : 389.6

BOLTS and Nuts

37/23 BRITISH Standards Institution, London.
. . . War emergency British Standard Specification for bolts, nuts and set-screws (machine bolts) B.S.W. and B.S.F. London, British Standards Institution, 1942. (British standard 1083 : 1942).
9p. tables, diagrs.
(In National Chemical Research Laboratory).
Pam. 621.882 : 389.6

BRICKS

37/25 BUTTERWORTH, B.
Bricks and modern research. London, Crosby Lockwood and Son, Ltd., 1948.
xiii, 160 p. plates (photos.), tables, diagrs.
"This book is written by a research chemist who has specialized in the study of clay building materials to provide a convenient summary, for architects, brickmakers, builders and others of the newer scientific knowledge of bricks."

BUILDING. Heating Aspects

37/28 CENTRALE organisatie voor toegepast-natuurwetenschappelijk onderzoek. Commissie voor de klimaatregeling in gebouwen. Klimaatregeling in woningen en werkruimten . . . Amsterdam, D.B. Centen's uitgeversmaatschappij voor Centrale organisatie voor togepast-natuurwetenschappelijk onderzoek, 1945.
(Rapport No. 1).
xix, 268 p. photos., tables, diagr. (one folding)
613.1 : 697(492)

37/29 GREAT Britain. Department of Scientific and Industrial Research. Building Research Station.
. . . Methods of calculating heat transmission in buildings, by A. M. Shklover . . . translated from the Russian by F. W. Masham . . . Garston, Building Research Station, 1947.
(Library communication no. LC 220).
72 p. tables, diagrs. (some loose in back cover).
A method suitable for boundary structures of one or several layers of different materials.
Pam. 697.133.001.24.

37/30 GREAT Britain. Department of Scientific and Industrial Research. Building Research Station.
Thermal insulation, by D. W. Saunders . . . and A. Pott. . . . (Garston), Building Research Station, 1947.
pp. 197-207 photos., tables, diagrs.
Reprinted from Building Digest, July, 1947.
Pam. 699.86

BUILDING. United States

37/32 GREAT Britain. Ministry of Works.
. . . Methods of Building in the U.S.A. : . . . report of a mission appointed by the Minister of Works.
London, H.M. Stationery Office, 1944.
20 p. map.
Pam. 69(73)

BUILDING Codes

37/33 AMERICAN Standards Association New York. Building Code Correlation Committee.
. . . Information on sources of material for use in preparing and revising local building codes . . .
New York, American Standards Association, 1944. (CB 89).
25 p. Mimeographed. Superseding CB 69.
Pam. 69.001.3 : 016

CEMENT

37/39 POWERS, T. C. and T. L. Brownyard.
. . . Studies of the physical properties of hardened Portland cement paste . . . Chicago, Portland Cement Association, 1948. (Portland Cement Association.
Research laboratories, bulletin 22)
pp. 101-992. Photos., tables, diagrs.
Reprinted from Journal of the American Concrete Institute, Oct., 1946 — April, 1947, Proceedings, vol. 43, 1947.
"This paper deals mainly with data on water fixation in hardened portland cement paste, the properties of evaporable water, the density of the solid substance and the porosity of the paste as a whole."
666.942

COMPRESSED Air Receivers

37/47 BRITISH Standards Institution, London.
. . . Solid drawn steel air receivers. London, British Standard Institution, 1944. (British standard 430 : 1944).
9p. tables, diagrs.
(In National Chemical Research Laboratory).
Pam 621.532.1 : 669.14 : 389.6

CONCRETE

37/48 MURDOCK, L. J.
Concrete materials and practice . . . London, Edward Arnold and Co., 1948.
vii, 328 p. photos, tables, diagrs.
A broad outline of the science of concrete making. Properties of concrete, design of mixes, handling and placing, curing, surface finishing, inspection and testing of work. Form work, reinforcement, types of construction, precast products, lightweight concrete, floor surfacings.
666.97

CONCRETE Construction

37/49 GREAT Britain. Department of Scientific and Industrial Research. Building research station.
. . . Construction joints in concrete : bonding new concrete to old, by Norman Davey . . . London, H.M. Stationery office, 1930. (Building research, special report no. 16).
74 p. front. (photo.), plates (photos.), tables, diagrs. (one on thin paper over front).
Pam. 624.012.3

CONCRETE Expansion Joints

37/50 ILLINOIS. University. Engineering experiment station.
. . . Experience in Illinois with joints in concrete pavements : a report of investigations by . . . John S. Grandell (and others) . . . Urbana, University of Illinois, 1947.
(Bulletin no. 23, vol. 45, December 3, 1947 ; Engineering experiment station bulletin series no. 365).
260 p. photos., tables (1 folding) diagrs. (1 folding on back cover).
625.84.083.

CONCRETE Mixes

37/51 GREAT Britain. Department of Scientific and Industrial Research. Road Research Laboratory.
. . . Design of concrete mixes. London, H.M. Stationery Office, 1947. (Road note no. 4).
10 p. tables, diagrs. Pam. 666.971.11.

37/52 GREAT Britain. Department of Scientific and Industrial Research. Road research laboratory.
. . . Effect of batching errors on the uniformity of concrete. London, H.M. Stationery Office, 1947.
(Road note no. 3)
9 p. tables, diagrs.
Pam. 666.971.11.

CORROSION

37/56 SPELLER, Frank N.
Corrosion: causes and prevention: an engineering problem . . . second edition. New York, McGraw-Hill Book Company, inc., 1935.
xiii, 694 p. photos, tables, diagrs.
Bibliography pp: 629-655.
Includes chapters on corrosion prevention underwater; in closed water systems by removal of dissolved gases; in high pressure steam plants; in steam and hotwater heating systems; in chemical industries; underground. Appendix gives lists of materials suitable for handling various chemicals.
620.191.

ELECTRIC Wiring

37/66 SOUTH African Institute of Electrical Engineers (inc.), Johannesburg.
. . . Standard regulations for the wiring of premises . . . Johannesburg, South African Institute of Electrical Engineers inc., 1948.
iv, 170 p. tables.
(In National Chemical Research Laboratory).
621.316.9:389.6

ENGINEERING Research

37/70 TORONTO. University. School of Engineering Research . . . Bulletins . . . Toronto, University press, 1919 — vols. illus., photos., table, diagr. (some folding).
Holdings: No. 1, 1919; No. 2, 1921; No. 3, 1922; No. 4, 1924; No. 5, 1925; No. 6, 1926; No. 7, 1927; No. 8, 1928; No. 9, 1932.
6(061.6.055.2)

FACTORIES. Location

37/71 PUMPHREY, Roland.
Industry and town planning, with an introduction by . . . Sir Montague Barlow . . . London, Faber and Faber, limited, 1946?. (Rebuilding Britain series, no. 6).
36 p.
Illustrates conclusions of the Barlow Report on the Distribution of the Industrial Population.
Pam. 711.4:6(42).

GAS Cylinders

37/77 BRITISH Standards Institution, London.
. . . 'High carbon' steel cylinders for the storage and transport of permanent gases. London, British Standards Institution, 1944. (British standard 399: 1930).
9 p. diagrs.
(In National Chemical Research Laboratory).
Pam. 621.532.1: 669.14: 389.6.

37/79 BRITISH Standards Institution, London.
. . . 'Low carbon' steel cylinders for the storage and transport of 'permanent' gases. London, British Standards Institution, 1944. (British standard 400. 1931).
9 p. diagrs.
Pam. 621.532.1: 669.14: 389.6.

37/81 BRITISH Standards Institution, London.
. . . Valve fittings for compressed gas cylinders. London, British Standards Institution, 1945. (British Standard 341: 1945).
21 p. tables, diagrs.
(In National Chemical Research Laboratory.)
Pam. 621.532.1: 389.6.

GREAT BRITAIN. Chemical Research Laboratory, Teddington.

37/84 GREAT Britain. Department of Scientific and Industrial Research. Chemical Research Laboratory.
. . . The chemical research laboratory. Teddington, Chemical Research Laboratory, 1947.
3 p.
Reprinted from Nature, Vol. 160, July 26, 1947, p. 133.
Pam. 54: 061.6(42).

HEAT Engines

37/87 ALLEN, John R. and Joseph A. Bursley.
Heat engines: steam, gas, steam turbines and their auxiliaries . . . fifth edition. New York, McGraw-Hill Book Company, inc., 1941.
xxi, 576 p. photos, tables, diagrs.
621.1+536.8.

37/88 LOW, David Allen.
Heat engines: embracing the theory, construction, and performance of steam boilers, reciprocating steam engines, steam turbines and internal combustion engines . . . London, Longmans, Green and Co., 1946.
vii, 592 p. tables, diagrs.
621.1+536.3

HEATING

37/89 DYE, Frederick W.
Heating and hot water work: some of the problems and difficulties arising in practice . . . second edition . . . London, E. & F. N. Spon, Ltd., 1946.
viii, 192 p. tables, diagrs.
697.

HOUSES

37/90 MOCK, Elizabeth B.
If you want to build a house; illustrated by Robert C. Osborn. New York, Simon and Schuster (c1946).
(The Museum of Modern Art).
96 p. illus., photos.
728

HOUSES. Insulation.

37/91 CANADA. National Research Council. Division of Physics and electrical engineering.
The insulation of houses, by J. D. Babbitt . . . Ottawa, National Research Council, 1946. (N.R.C. No. 1386).
23+p. illus., tables, diagrs. Planographed.
Pam. 697.133.

HOUSING. Great Britain.

37/92 GREAT Britain. Ministry of Health. Central Housing Advisory Committee.
The appearance of housing estates . . .; report of the sub-committee on the means of improving the appearance of local authority housing estates. London, H.M. Stationery Office, 1948.
27 p.
Pam. 728.1

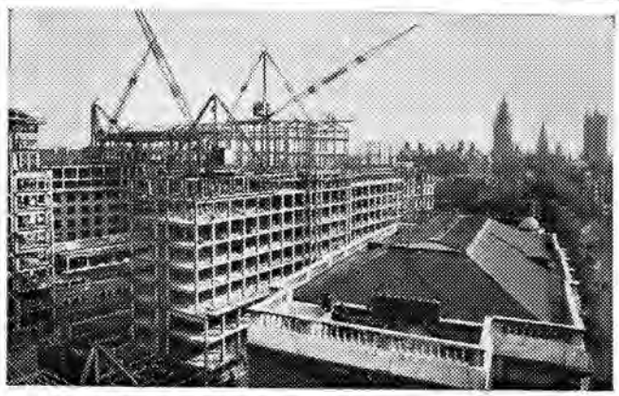
37/93 GREAT Britain. Ministry of Health and Ministry of Works.
. . . Housing manual 1944. London, H.M. Stationery Office, 1946.
104 p. illus., plates (photos.), plans, tables, diagrs.
Pam. 728.1

37/94 GREAT Britain. Ministry of Health and Ministry of Works . . . Housing manual 1944: technical appendices C. to L. London, H.M. Stationery Office, 1944.
92 p. tables, diagrs.
Pam. 728.1

37/95 GREAT Britain. Ministry of Works.
Temporary Housing Programme. London, H.M. Stationery Office, 1948 (Cmd. 7304).
11 p. tables.
Estimated costs of the Arcon, Uni-Seco, Tarran, Spooner, Universal, Phoenix, Orbit, Miller, American and aluminium houses.

INTERIOR Decoration

37/103 ASSOCIATION of Swiss interior architects.
Möbel und wohnraum . . . ed. by H. Guyer and E. Kettiger . . . Erlenbach — Zürich, Verlag für architektur, 1947.
168 p. illus., photos., plans, diagrs.
Introduction by Peter Meyer. Text in German, English and French.
749



New centralised offices, for the British Government, now under construction in Whitehall, London.

TENDERS INVITED

THE following are particulars of the more important tenders which have been invited up to the time of going to press for public works by Government Departments, Provincial Administrations and Municipalities. In each case the date by which the tender must be submitted is given. While every endeavour will be made to maintain accuracy in these columns it is pointed out that readers using this information do so entirely at their own risk.

BUILDING, ETC.:

Kroonstad: Steel windows for the proposed new Free State Technical College Building, Kroonstad. Tenders to the architect, Hennie Meyer, 19, Market Street, Kroonstad.

Vanderbijl Park: Iscor Housing Utility Company; The erection of a three-storey block of flats, type FH, at Vanderbijl Park for the Iscor Group Housing Organisation, Steelville Buildings, Marconi Street, Vanderbijl Park. (Deposit of £5-5-0). Quantity Surveyors: Messrs. Springthorpe, Standard Bank Chambers, Church Square, Pretoria. Due, 21/1/49.

ELECTRICAL AND GAS EQUIPMENT, ETC.:

Cape Town: Insulators. Specification C.T. 17, for the Electricity Supply Commission (Cape Western Undertaking), P.O. Box 117, Cape Town. Enquiry Counter, 7th Floor, Grand Parade Centre, Cape Town. Due, 10/1/50.

Durban Municipality: 33 k.v. cable and joints. Tender No. E. 2229. Electricity Department, Durban. Due, 3/2/50.

Durban Municipality. Transformers. Tender No. E.2228. Electricity Department, Durban. Due, 20/1/50.

Johannesburg Municipality: Diaphragm leathers for gas meters. Contract 32. Electric Stoves for Rand airport. Contract 33. City Treasurer, Johannesburg. Due, 19/12/49.

Mossel Bay Municipality: Electricity extensions. Contract E.2/1949. Town Clerk, Mossel Bay. Extended to: 21/1/50.

Pretoria: Supply, delivery, supervision of erection and test run of high voltage cable testing equipment, as follows: (a) High voltage testing transformer complete with input regulator, switch cubicle and control desk; (b) Schering bridge and standard condenser; (c) High voltage D.C. cable test set. Secretary, South African Bureau of Standards, Private Bag 191, Pretoria. Due, 14/12/49.

Salisbury Municipality: Distribution fuses. Contract S. 42/50. Stores Department, Salisbury. Due, 10/1/50.

S.A. Railways: Train-lighting material. Tender No. C.976. S.A. Railways Tender Board, 715, P.F.A.C. Building, 15, de Villiers Street, Johannesburg. Due, 9/2/50.

ENGINEERING EQUIPMENT, ETC.:

Bulawoya, Southern Rhodesia: The construction of, up to 10, earth dams on railway block No. 2, West Nicholson. Cold Storage Commission of Southern Rhodesia, P.O. Box 953, Bulawayo.

Lusaka, Northern Rhodesia: Materials for the Town Engineer's Department. Secretary, Management Board, P.O. Box 77, Lusaka (Northern Rhodesia). Due, 15/12/49.

Salisbury Municipality, Southern Rhodesia: Sewerage scheme: Supply and erection of sewage pumping plant required for two sewage pumping stations. Contract D/1949. Consulting and Chartered Civil Engineers: Stewart, Sviridov and Oliver, Balgownie House, 66, Commissioner Street, Johannesburg. (Deposit of £2-2-0 — extra copies of documents at £1-1-0 per copy). Due, 10/1/50.

FIRE BRIGADE EQUIPMENT, ETC.:

Bulawayo Municipality, Southern Rhodesia: Fire brigade and ambulance equipment. Contract 41/1949. Town Clerk, Bulawayo. Due, 14/12/49.

Pretoria Municipality: Fire extinguishers. Tender No. P.O. 1103. Department of Posts and Telegraphs, Pretoria. Due, 19/1/50.

ROADS:

Lusaka Municipality, Northern Rhodesia: Lusaka — Broken Hill Road, Section 3: The construction of 46 miles of bituminous surface road from Mile 47 north of Lusaka to Mile 2 north of Broken Hill and including three miles within the Broken Hill Township area, a total distance of, approximately, 46 miles. Contract CE/19/49. The above construction includes formation culverts, gravel base and bituminous surface. Consulting engineer, A. van Niekerk, van Riebeeck House, 320, Bree Street, Johannesburg. (Deposit of £5-0-0). **Note:** An engineer of the Public Works Department will be in attendance at the offices of the Provincial Engineer, Public Works Department, P.O. Box 98, Lusaka, on the 5th December, 1949, to conduct tenderers over the location of the work. Transport will be provided on prior notice being given to the Provincial Engineer. Due, 20/12/49.

TELEPHONE AND TELEGRAPH EQUIPMENT:

Pretoria Municipality: Switchboard spares. Contract Nos. P.O. 1092 and 1093. Brass and iron screws. Contract No. 1094. Telephone cords. Contract No. 1095. Department of Posts and Telegraphs, Pretoria. Due, 15/12/49.

WATER AND IRRIGATION EQUIPMENT:

Johannesburg: Rand Water Board: Additional water supply (1949) scheme: Supply, delivery and erection of plant and media for 32 rapid gravity sand filters at Zuikerbosch pumping station. Contract 738. (Deposit of £3-0-0 — extra copies at £1-0-0 per copy). Chief Engineer, 3, Fraser Street, Johannesburg. Due, 14/2/50.

Keetmanshoop Municipality: One submersible centrifugal A.C. water pump of 4/5,000 gallons p.h. capacity. Town Clerk, Keetmanshoop.

Marandellas, Southern Rhodesia: The covering of the Board's ground-level tanks. Secretary, Town Management Board, Marandellas, Southern Rhodesia.

Marandellas, Southern Rhodesia: Supply and erection of equipment for the electrification of all the Board's water pumping plant. (Deposit of £2-2-0). Secretary, Town Management Board, Marandellas, Southern Rhodesia. Due, 31/12/49.

Rusape: Electric pumping plant capable of delivering water at the rate of 12,500 gallons per hour. Head: 200 feet, size of main 4 inches, length 7,000 feet. Secretary, Town Management Board, Rusape.

Pretoria Municipality: Portable spray irrigation plant Contract Irr. 531. Controller of Stores, Irrigation Department. P.O. Box 277, Pretoria. Due, 22/12/49.

TENDERS ACCEPTED

AIR CONDITIONING AND REFRIGERATION PLANT, ETC.:

Supply, delivery and erection of new air conditioning plant at the Automatic Exchange Extension, Jeppestown, Johannesburg, for the Department of Public Works. Tender No. 24/1/1587. P.W.D. 254. Safanco, Ltd., Johannesburg. £4,444.

Supply, delivery and erection of new air conditioning plant, Automatic Exchange Extensions, Malvern, Durban, for the Department of Public Works. Tender No. 24/1/689. P.W.D. 245. Airco Engineering Ltd., Durban. £2,085 3s.

Supply, delivery and erection ex-local stocks of a ventilating plant in the X-ray block of the Tuberculosis Hospital, Umtata, for the Department of Public Works. Tender No. 24/1/1910. P.W.D. 225. R. D. Nash (Pty.), Ltd., Johannesburg. £857.

Supply, delivery and erection of mortuary refrigerating plant for the Medico-Legal Laboratories of the South African Police, Johannesburg, for the Department of Public Works. Tender No. 24/1/99. P.W.D. 257. Transvaal Spice Works, Johannesburg. £609.

Supply, delivery and erection of ventilating plants at Buildings of Hybrid Maize Production at the College of Agriculture, Potchefstroom, for the Department of Public Works. Tender No. 24/1/1671. P.W.D. 260. R. D. Nash (Pty.), Ltd., Johannesburg. £476.

Supply, delivery and erection of air-conditioning plant for the humidity store at the building for Hybrid Maize Production at the College of Agriculture, Potchefstroom, for the Department of Public Works. Tender No. 24/1/1671. P.W.D. 261. Household Appliances, Ltd., Pretoria. £454 10s.

Refrigeration Cabinet to the Onderstepoort Laboratory. Tender No. 25/1/290. S.O. 3683. Barlow's Electrical Department (Pty.), Ltd., Pretoria. £210.

BUILDING AND ALTERATIONS, ETC.:

Customs Office and King's Warehouse, Pretoria, for the Department of Public Works. Tender No. 24/1/2008. P.W.D. 263. S. D. Naude (Pty.), Ltd., Pretoria. £62,428.

Police Station and quarters, Mayville (Durban), for the Department of Public Works. Tender No. 24/1/1302. P.W.D. 252. Royce Kincaid (Pty.), Ltd., Durban. £45,609.

Police Station and Area Headquarters, Harrismith, for the Department of Public Works. Tender No. 24/1/1877. P.W.D. 256. Graaf en De Waal, Pretoria. £34,722.

New Station Buildings: Rissik, for the South African Railways. Tender No. CCE 176. G. Newlands (Pty.), Ltd. £8,748.

Erection of forty-two houses at Waterval Boven for South African Railways. B. J. van der Walt, £11,151 1s. 6d. P. W. Venter, £67,568 13s. 0d.

1,800 sq. yards kiaat flooring blocks to the Technical High School, Pietersburg, for the Department of Public Works. Tender No. 24/1/1606. P.W.D. S.391. Universal Wood Industries, Ltd., Pretoria. 17s. 9d. per sq. yard.

COOKING EQUIPMENT, ETC.:

Supply, delivery and erection and fixing in position of two heat storage cookers in the Hospital and Nurses'

TENDERS ACCEPTED – continued.

Home at the new Tuberculosis Hospital, Umtata, for the Department of Public Works. Tender No. 24/1/910. P.W.D. 267. M. Green and Co. (Pty.), Ltd., Cape Town. £1,168 11s.

Steam pressure cooker to the Housecraft High School, Adelaide, for the Department of Public Works. Tender No. 25/1/393. S.O. 3469. Messrs. Chubb and Maxwell, Ltd., Cape Town.

ELECTRICAL EQUIPMENT, ETC.:

Fifty electric fans, 12″ diameter, for the South African Police. Tender No. 19/1/7. S.A.R. 453. The British General Electric Co., Ltd., Johannesburg. £5 8s. 9d. each.

Electric drilling machine to the School of Industries Queenstown. Tender No. 25/1/1501. Union Engineering Supply, Co., Ltd., Durban. £225.

ENGINEERING EQUIPMENT, ETC.:

Construction of bridges and culverts between O.M. 40C and 12M. 30C: Grootvlei-Redan line for the South African Railways. Tender C.C.E. 175. U. Bandini. £7,924 16s.

Supply and delivery of tubular steel poles, specification No. 1557 1949, for Cape Town Municipality. Stewarts and Lloyds of S.A., Ltd. £9,706 8s. 8d.

Five concrete mixers to the Department of Native Affairs. Tender No. 25/1/922. S.O. 3623. Millars Timber and Trading Co. (Overseas), Ltd., Johannesburg. £120 each.

Supply, delivery and erection of 1,000 cub. ft. gas holder, Stellenbosch-Elsenburg College of Agriculture, Stellenbosch, for the Department of Public Works. Tender No. 24/1/1726. P.W.D. 269. City Engineering Works, Woodstock. £323.

Hammermill to the Department of Native Affairs, Thaba 'Nchu. Tender No. 25/1/956. S.O. 3653. D. J. J. Bekker (Pty.), Ltd., Johannesburg. £69 15s. also **Two internal combustion engines.** £110 each.

Five portable power plants to the Department of Native Affairs, Pretoria. Tender No. 25/1/922. S.O. 3593. Barlow's and Sons (S.A.), Ltd., Johannesburg. £135 each.

Roads, drainage and sewerage for quarters, Montclair, Natal. Tender C.C.E.138. French and Wolton Gray, Ltd. £15,957 9s. 5d. for South African Railways.

Earthworks (offloading, transporting and levelling), construction, Pretoria. Tender No. C.C.E. 141. P. C. Venter. £6,250. For South African Railways.

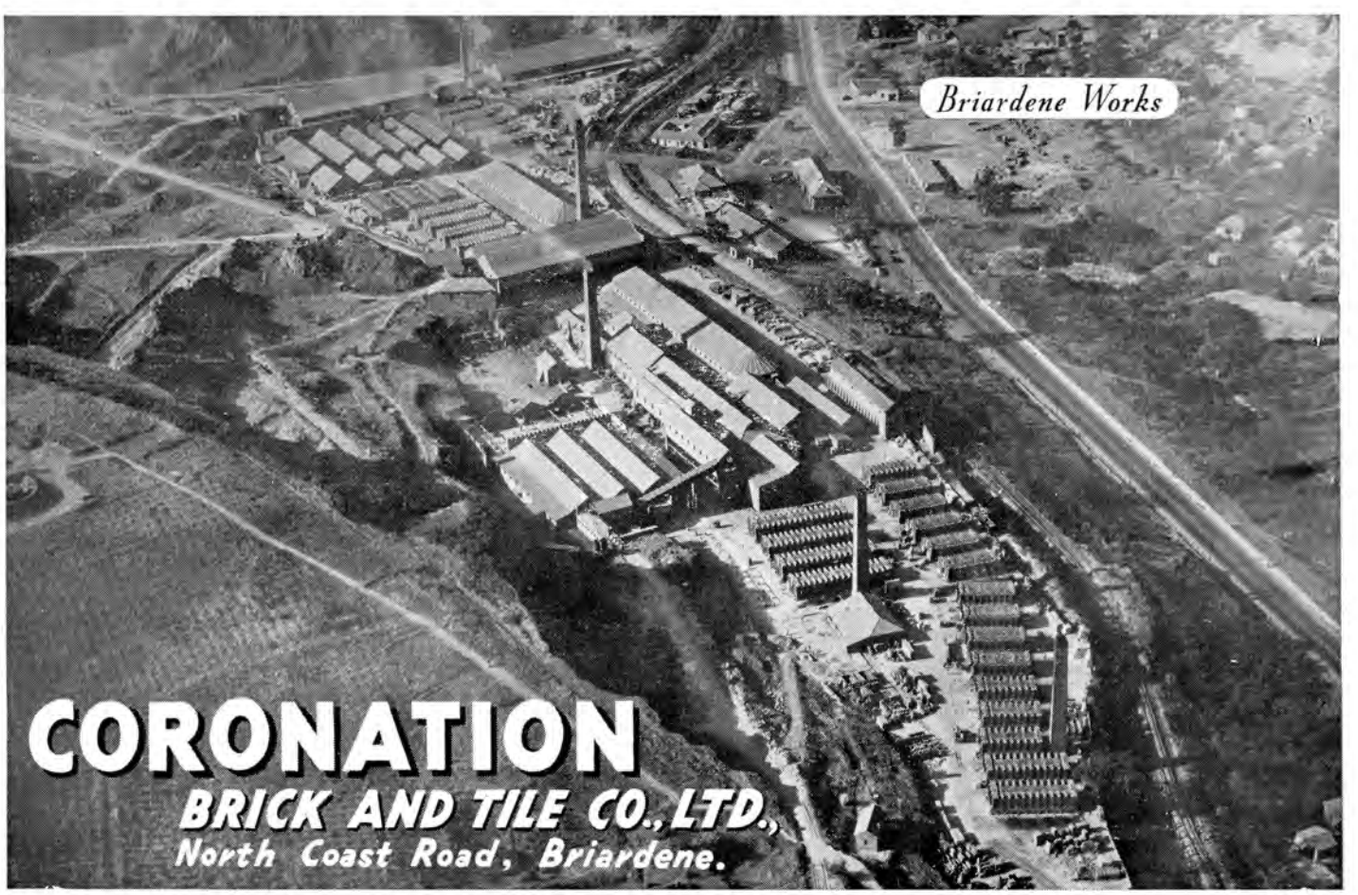
Earthworks, Wanderers, Johannesburg, for South African Railways. Tender No. C.C.E. 166. W. J. Hammon and Co., £5,000.

Sluice valves and C.I. specials for use at Retreat Housing scheme, for Cape Town Municipality. Informal Tender 565/49. Stewarts and Lloyds of South Africa, Ltd.

HOSPITAL AND LABORATORY EQUIPMENT:

Syringes to the Onderstepoort Laboratory. Tender No. 25/1/40. S.O. 3639. Union Medical Supplies (Pty.), Ltd., Cape Town. Medical Distributors, Johannesburg.

Chemicals and apparatus to the Stellenbosch-Elsenburg College of Agriculture, Stellenbosch. Tender No. 25/1/914. S.O. 2827. Macdonald Adams and Co., Johannesburg.



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INFORMATION SHEET

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

Height of Chimneys.

31. Q: What minimum height of chimney is recommended for dwellings?

A: The minimum height of a chimney is determined by its position on the roof in relation to wind exposure and fire hazard.

When the wind blows, zones of high and low air pressure are built up over the roof of a building and in fixing the height of the chimney it is desirable to ensure that the terminal does not extend into a possible zone of high pressure, a condition which might result in down-draught causing smoke to be emitted into the interior of the building.

For pitched roofs it has been found that the minimum discharge height should be 2 feet above that point of the roof, nearest the chimney, which is at a horizontal distance of 7′ 6″ from the outside surface of the chimney. Although this recommendation implies that a chimney need not be higher than the ridge of the roof other considerations may make this advisable: e.g. neighbouring obstructions such as buildings or trees may affect pressure conditions near the roof, and chimneys built to some height above ridge level will considerably minimize down-draught tendencies. Furthermore, where the roof covering consists of a combustible material such as thatch or shingles the discharge end of the chimney should be at least level with the ridge.

In the case of very low pitched roofs a minimum chimney height of 5 feet above the roof is recommended.

Vacuum Concrete.

32. Q: What is vacuum concrete and under what circumstances is it used?

A: It is well known that the reduction of the water content improves the quality of concrete. In ordinary concrete, however, as the water content is reduced, the material becomes progressively more difficult to place. The vacuum method has been developed in an effort to overcome this difficulty.

In this process the mix is made rather wetter than usual to facilitate placing and after placing the concrete, a vacuum is applied to the accessible concrete surfaces to remove the excess water. A vacuum, reducing the absolute pressure to about 5 inches of mercury, is used, and this, besides removing the excess water, induces a pressure of about 12 lb./sq. in. maximum on the concrete thus assisting in further consolidation.

The process has been used for the treatment of roads, floors, precast products and dams. Several other applications are at present being developed.

The adavntages claimed for the method are that strength is increased, shrinkage is reduced, bond with reinforcement is improved, and hardness and resistance to wear are greatly improved.

Aggregate Ratio.

33. Q: Concrete is frequently specified with a fine to coarse aggregate ratio of 1: 2. Does this yield a satisfactory concrete in so far as workability and economy are concerned?

A: For all important concrete jobs it is advisable to design the concrete so as to give the best compromise between all the factors which have to be considered. In the case of smaller works or in cases where quality is not of prime importance, it is probable that the more or less arbitrary selection of mix proportions is justifiable. A 1: 2 sand to stone ratio will, however, generally yield a rather harsh concrete, an effect which is usually more pronounced when the smaller grades of coarse aggregate or when crushed stone aggregates are used. This harshness and an accompanying tendency to segregate become more pronounced the leaner the mix. Furthermore,

if the materials are measured out by volume and the sand is moist, the resultant mix will generally contain less than the nominal proportion of sand, thus aggravating the position.

Hence it is generally desirable to increase the proportion of sand to some value greater than half of the amount of the stone, without increasing the total quantity of coarse aggregate. The amount of the increase will depend on such factors as type of job, richness of mix, grading and shape of aggregate particles, and method of consolidation. In this way workability, denseness and finish can be improved and segregation reduced without necessarily increasing the cost.

"Popping" in Plaster.

34. Q: What is the cause of "popping" in plaster and how can this disfigurement be avoided?

A. "Popping" is the name given to the formation of crater-like pits in a plaster; these vary in size from a sixteenth of an inch or less to several inches in diameter. Such "pops" are more liable to occur within a year of application of the plaster but their appearance may be delayed beyond this period.

They are usually caused by the expansion of unslaked particles of lime present in the plaster. At the base of the craters small cores of material, generally darker than the surrounding plaster, can usually be found. It is the expansion of these particles which is responsible for forcing out the cones of plaster.

Patching of the walls in which "pops" have occurred is seldom satisfactory and complete stripping and replastering have usually to be resorted to in severe cases. Isolated "pops" can sometimes be filled in with Plaster of Paris.

This type of disfigurement can, in most cases, be avoided by ensuring that the lime used in preparing the plaster does not contain coarse particles and that it is completely slaked before use. So-called "building lime" often contains much coarse material and it is inadvisable to use this class of product for plaster work.

It is recommended that all lime used in plasters, as well as the other constituents of plaster, be tested against an appropriate specification before being used and that adequate time be allowed for complete slaking.

Sewer Pipe Joints.

35. Q: What is a good material for jointing earthenware drainage and sewer pipes around buildings?

A: In addition to the prerequisite of watertightness the four essentials of a good sewer pipe joint are that it should be easy to make under average conditions, it should not deteriorate in contact with soil or sewage, it should resist root penetration and it should not break due to ground movement.

Portland cement mortar makes a rigid joint which will not allow the pipes to move with the soil and this frequently results in broken pipes or joints. If the soil is expansive, i.e. it changes in volume with changes in moisture content, the additional moisture derived from the breaks frequently results in serious damage to buildings in the vicinity.

Hot poured bitumen joints are flexible, but are not very resistant to root penetration. Even with the addition of poisons such as creosote and copper oleate, penetration of roots is only temporarily delayed.

The best jointing material appears to be a fairly hard coal tar pitch with a powdered silica filler. The mixture requires heating before a satisfactory joint can be made with it. It flows slowly under stress and still remains watertight. It is hard enough to resist roots, and, especially in the smaller sizes of pipe, it is easier for the average workman to make a good joint with coal tar pitch than with Portland cement.

W.P.—68347—17/10/49.