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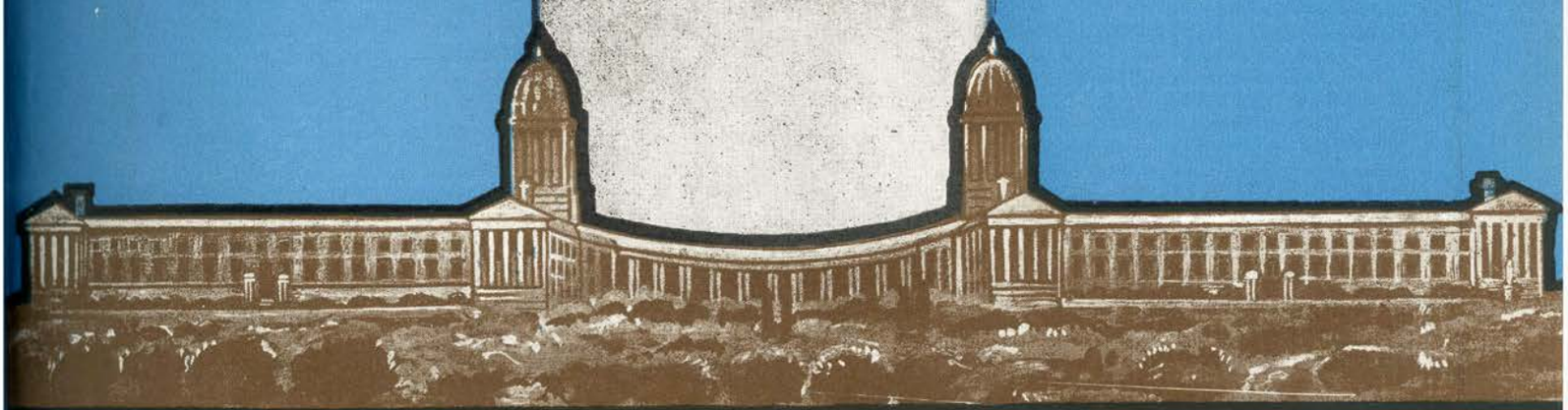

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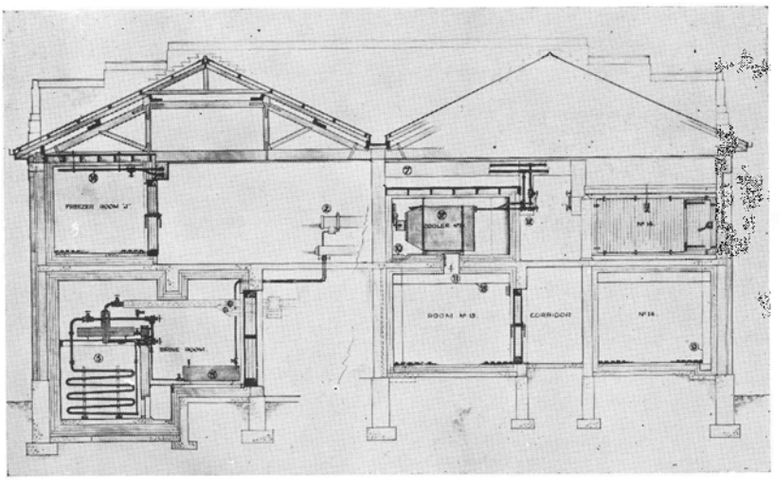

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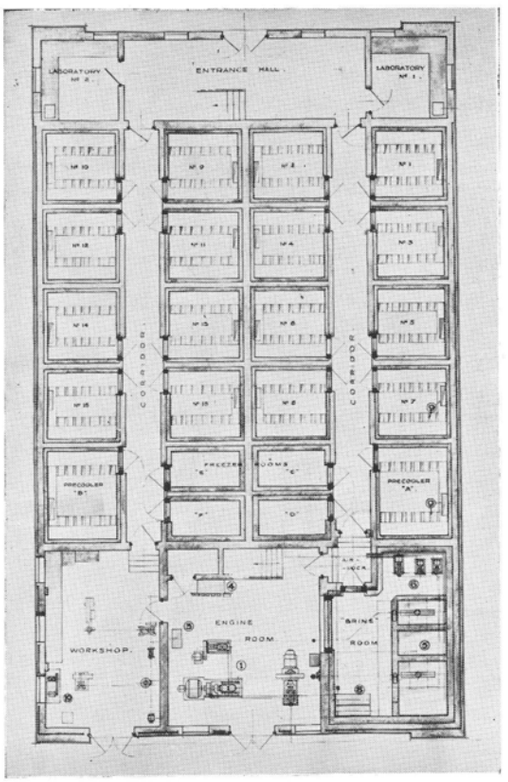

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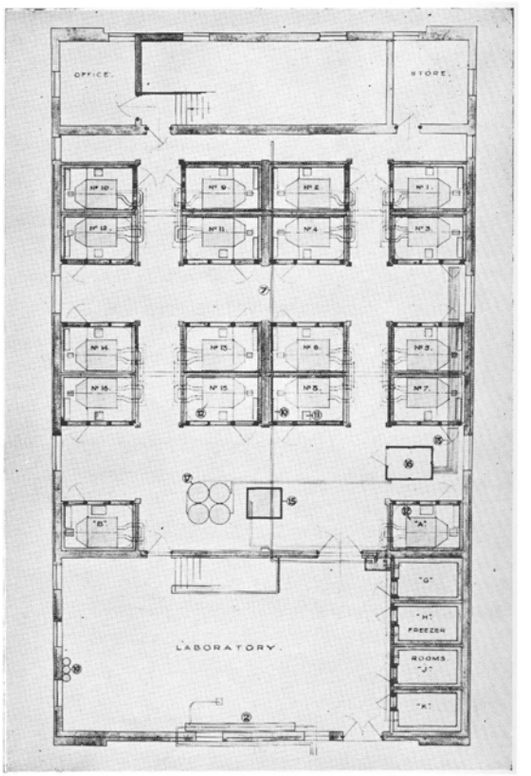

FIRST FLOOR.

Government Low Temperature Research Laboratory, Cape Town.

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Government Low-Temperature Research Laboratory, Cape Town

ADMINISTRATIVE AND LABORATORY BLOCK.

★

Research Centre For Fruit Precooling, Storage And Transport

★

THE rapid development of the export trade in South African deciduous and citrus fruits made the extension and intensification of investigations into fruit transport and storage an urgent necessity, particularly as commercial practice is largely dependent on the results of research work in this field.

Prior to December, 1934, when the new cold storage block of the Laboratory was completed, research activities had been hampered by lack of space in the old premises in the centre of Cape Town, extensions to which were impossible. The Laboratory was thus moved to new buildings on a site near the Harbour area, housing administrative offices and laboratories, and cold storage chambers respectively.

Considerable thought had to be given to the design of the cold storage block in order that it should fulfil all the essential requirements of a research institution. It had to have sufficient storage space of a suitable type to satisfy all requirements for several years for small-scale fruit storage investigations, and to initiate, if necessary, investigations into the storage of other products, such as frozen fish, eggs or other perishables.

Ample space has been provided for the precooling, storage and ripening of fruit, the normal cycle of processes through which all fruit passes under commercial conditions on its way from the grower to the consumer.

The design has aimed at the elimination of all unnecessary handling of the commodities stored, and the lay-out of the building is shown in the ground-floor plan. The cold chambers are situated on each side of two corridors running the length of the building, an arrangement that has proved satisfactory in all respects.

Furthest from the entrance are two precooling chambers, slightly larger in size than the storage chambers, for the precooling of fruit prior to removal to the sixteen storage and ripening rooms. To left and right of the entrance are two small laboratories separated by a large inspection hall, where all fruit is examined after storage. The engine room, brine room and workshop are situated at the back of the building.

All of these eighteen chambers are independently cooled by air-circulation at the rate of 2.3 changes of air per minute, and are of identical construction, the air-cooling batteries and fans being situated on the first floor immediately above each room, as shown in the first-floor plan.

The location of the cooling batteries in this position enables each battery to be readily accessible in the event of repair being necessary, in addition to providing vertical air circulation in the chambers without complicated air-trunking systems. The reduction in the floor space which would be required were the batteries located either within or adjacent to the cold chambers, is considerable.

The insulation of the cold chambers is also more efficient under this arrangement, as a large air-space is thus provided between the ceiling of the building and the roof of the cold chambers, the point at which the highest temperatures are usually encountered.

In addition to the cold chambers, which are primarily intended for temperatures above freezing, there are eight small freezing-rooms, four of which are located on the ground floor and four on the first floor, the latter being intended for investigations into the freezing and storage of fish. These freezing-rooms are all cooled by ceiling coils, while four have been provided with side coils in addition, and are all equipped with thermostatically controlled heaters and fans for assisting the natural air circulation.

General Construction Details

THE outer walls of the building are plastered brick approximately 16 inches thick with a 2-inch cavity to minimise heat leakage into the building and the passage of moisture through the walls. All floors are of concrete with either an asphaltic or granolithic finish. Parapet walls conceal the double-hipped roof, which is of a special bitumen-protected metal sheeting owing to the proximity of the building to Table Bay.

The insulation of the building is almost entirely slab cork, 6 inches in thickness for all storage rooms and cooling batteries, 9 inches for all freezing-rooms, and 12 inches for brine tanks.

Granulated cork is used for the ceiling of the air-cooling batteries, while all low-temperature pipe lines have been insulated with granulated cork in metal-enclosed ducts. The latter insulation is gradually being replaced by moulded cork, which is infinitely more durable. The application of a bituminous finish to it gives ample protection against the passage of water-vapour into the insulating material.

Prior to the application of the slab cork insulation, all walls were cement-plastered and waterproofed with natural asphalt preparations, and the cork bonding was either a natural asphalt preparation or bitumen from mineral oil refineries. The second layer of cork was laid on the first with staggered joints, bonded with bitumen and secured by means of wooden skewers. The ceiling insulation was placed in position on the concrete forms prior to pouring the concrete slab, a method which is far cheaper than, and equally efficient as, the attachment of the insulation to the finished slab.

In all insulated spaces the inner surface of the cork insulation was provided with rebated grooves at suitable centres in which timber nailing strips were secured. All the inner surfaces are covered with 20-gauge galvanised sheeting secured by nailing into the nailing strips, all joints being lapped and all nail heads and laps being soldered over. The inner surfaces of doors and door frames are similarly covered with sheet metal, and all metal surfaces are painted and finished off in glossy white oil paint.

Although not accepted practice, sheet metal lining to the rooms had to be used as it eliminates any possibility of mould growth or the absorption of odours, and it can be very easily cleaned and disinfected. Such a lining can be successfully applied only if extraordinary precautions have been taken to render the insulation impervious to the passage of water-vapour, particularly at the warmer faces.

It can be realised that the cost of completely soldering all joints in a metal lining would be prohibitive in the case of a commercial undertaking. But unless this is done it is far better to use a cement-plaster finish to the walls and allow slight permeability to the passage of water-vapour, thereby allowing the insulation to " breathe " and prevent the accumulation of moisture in the insulation. It is important, however, that the warmer faces be rendered as vapour-proof as possible.

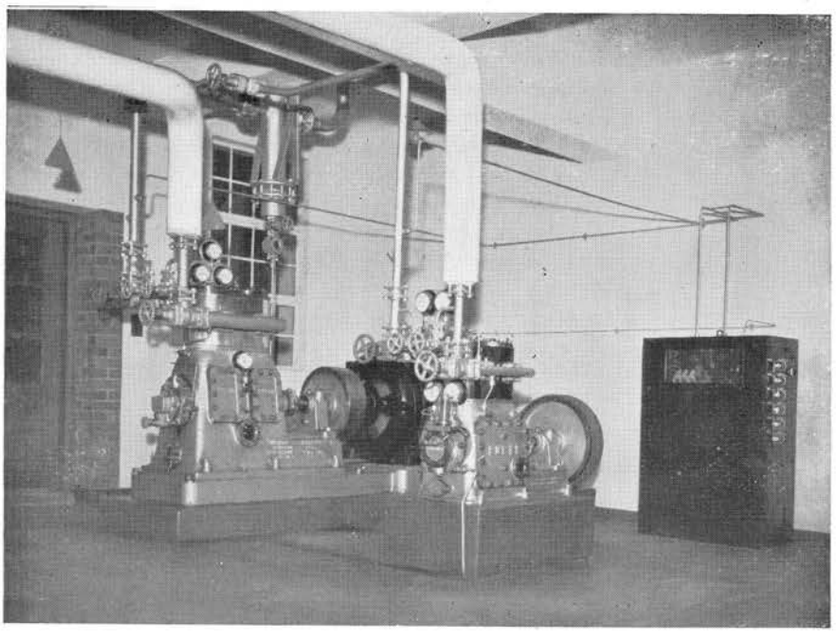
COLD STORAGE CHAMBERS LEADING OFF ONE OF THE CORRIDORS.

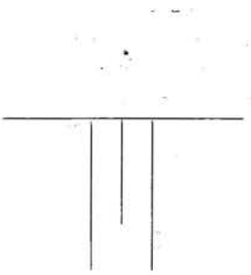
The question of suitable paints for finishing off cold chambers is also worthy of thorough investigation. It is almost impossible to obtain a lasting white finish for cold chambers and corridors which will be immune from the action of small concentrations of ammonia or the absence of light.

Although many paints have been and are still being tried, the gradual yellowing with age seems unavoidable. In commercial cold stores where woodwork has to be given a protective white finish the difficulty is that paint will not adhere to the woodwork under conditions of either extreme dampness or very low temperatures, although many types of paint using various solvents have been tried.

Where asphaltic or bituminous finishes require painting, either in cold rooms or on moulded cork coverings, the difficulty appears to be in obtaining a paint having the same coefficient of linear expansion as the material covered by it; differing coefficients of expansion or contraction result in cracks in the paint surface. Where the paint is sufficiently elastic not to crack, a durable glossy surface cannot be obtained.

Although the introduction of coloured bitumen emulsions has partially solved the difficulty of painting bituminous finishes, the expense and limited range of colours does not render them suitable for all uses and their application requires rather more skill than the application of paint. With the trend of modern cold storage practice to utilise paint for providing a washable finish to cold storage chambers, it is felt that paint manufacturers should concentrate on producing a paint that will stand up to this type of work and at the same time be comparatively odourless.





Two of the Three Compressors With Automatic Control Panel

Storage Rooms

THE 16 storage rooms and two precooling rooms are of identical construction, the former being approximately 10′ x 10′ x 8′ inside insulation, and the latter 13′ x 10′ x 8′. Air is cooled in the battery above and delivered through a sheet metal false ceiling provided with adjustable air deflectors and ports. Two air ducts are recessed in the floor, and are also provided with adjustable openings. These serve to collect the air and conduct it *via* a sheet metal trunk on the rear wall of the chamber back to the cooler.

Fruit is stacked on wooden racks or grids approximately 3 inches high, and these serve as air chambers to the recessed suction ducts. It will thus be seen that the rooms can be adapted with very little difficulty to completely jacketed chambers if necessary.

Refrigerating Equipment

OWING to the multiplicity of temperatures that must be maintained in experimental storage investigations, and the extreme accuracy of temperature control required, the indirect or brine system of refrigeration has been used. Any direct method would be extremely complicated and not as satisfactory.

The brine system lends itself to a simplified method of automatic control of the refrigerating compressors, and by circulating brines of various temperatures, desired differences in temperature between the refrigerant and the air circulated through the rooms can be maintained for various room temperatures. This is attained by the provision of three brine tanks and evaporators, the largest being used for the constant-temperature storage rooms, one for the precooling rooms and one for the freezing circuits.

Complete flexibility is obtained by the use of three centrifugal pumps so arranged as to enable any brine tank to be used on any circuit through any pump. The pumps are of 120 gallons per minute capacity against a head of 30 feet, a portion of the brine being by-passed through a relief valve back to the tank in order to maintain a constant pressure in the system and at the same time agitate the brine. Pump bodies and impellers are of corrosion-resistant metals. The evaporators in the tanks are arranged for flooded operation and the illustration opposite shows their arrangement, with float control of liquid level and surge drums above.

The compressor plant consists of 3 two-cylinder, electrically-driven, vertical enclosed single-acting ammonia compressors, two arranged for either completely automatic or manual control, and one purely for manual control as a stand-by. The larger compressor (bore and stroke 5½″ x 5″, speed 280 r.p.m.) is arranged for two-temperature working on the chilling and precooling brine tanks; automatic control for this working is obtained by means of motorised valves on the ammonia return lines to the surge vessel controlled by thermostats immersed in the brine.

The electrical interlocking of these thermostats enables the compressor to be operated on either or both tanks automatically, and is only stopped when each tank is at the required temperature. The smaller automatic compressor (bore and stroke 3½″ x 3″, speed 410 r.p.m.) carries the more constant load of the freezing chambers and is similarly controlled by a thermostat in the brine tank.

Two horizontal shell and tube condensers are situated above the engine room, while condensing water is provided by an evaporative water cooler, situated, together with its circulating pump, outside the building. A non-condensible gas purger is provided in the engine room for eliminating all foreign gases from the system without loss of refrigerant.

Each of the air-cooling units consists of two independent transverse coil sections of 80 lineal feet of 1½″-bore steel pipe with a propeller-type fan attached to the casing. The fan has a capacity of approximately 4,800 cubic feet of air per minute

in the case of the precooling rooms and 2,500 cubic feet per minute in the case of the storage rooms.

A sheet metal deflector is provided for deflecting the air delivered by the fan over either or both sections of the cooling coil or for controlling the proportion of air by-passed through the inoperative section. The entire cooler is encased by a galvanised sheet steel casing of stout gauge with the bottom arranged as a tray for collecting condensed moisture.

In the case of the freezing rooms, those on the ground floor are equipped with brine grids on the ceiling and three walls, while those on the first floor have brine grids on the ceiling supplemented by direct-expansion ammonia piping under the brine grids.

Temperature Control

TWO independent systems of temperature control are provided: firstly, the system controlling the operation of the compressors by means of thermostats working on a 3°F. differential in the brine tanks, and, secondly, the system controlling the temperature of the air entering the storage rooms. The latter system consists of manually operated brine valves on the coolers together with thermostatically controlled heaters.

The capacity of the heaters can be varied, as the rooms may be operated at temperatures above air temperature for observation of ripening after storage or for processing fruit prior to storage. Although this system of control has operated satisfactorily, and the input to the heaters has remained small, several air coolers have been equipped with thermostatically operated solenoid valves controlling the flow of brine through a small-bore pipe short-circuiting the main control valve with a small hand-set valve in series with the solenoid valve metering the flow through the latter. These solenoid valves were at first connected in parallel with the heaters, but it has since been found possible to eliminate the heaters entirely and by carefully adjusting the residual opening of the solenoid valve to obtain extremely accurate temperature control.

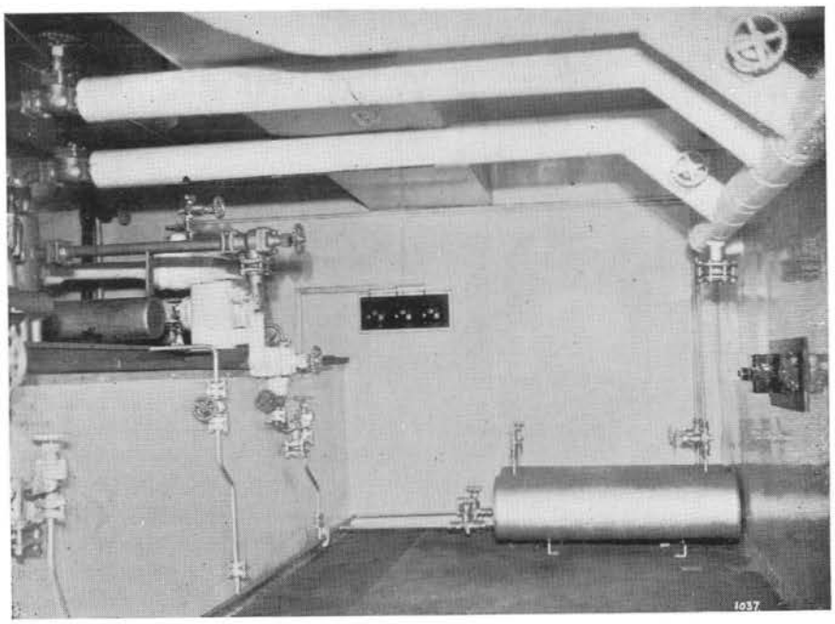
All controls to the cooling batteries are situated on the first floor, where also are the four 6-point electrical temperature recorders for recording the air delivery temperature in each of twenty-four rooms every twelve minutes. Copper thermometer elements have been chosen to give a linear scale on the recorder and to enable coils of known values to be inserted in the thermometer leads to extend the scale of the instruments. These recorders operate on the self-balancing Wheatstone Bridge principle directly from the electrical mains, and are arranged for triple leads, giving an overall accuracy of approximately 0·1°F.

In addition to the above, equipment for small-scale experiments on the gas storage of fruit has been installed, and this is being constantly supplemented according to the demands of the problems under consideration.

The administrative offices and laboratories were completed some fifteen months after the completion of the cold storage block. They form a particularly well-equipped building containing twelve large laboratories and two offices for the administrative staff.

In addition to the investigations on fruit storage, the activities of the Laboratory include the investigation of the physics of precooling, entomology, mycology, chemistry and general biological work on the preservation of fruit under refrigeration.

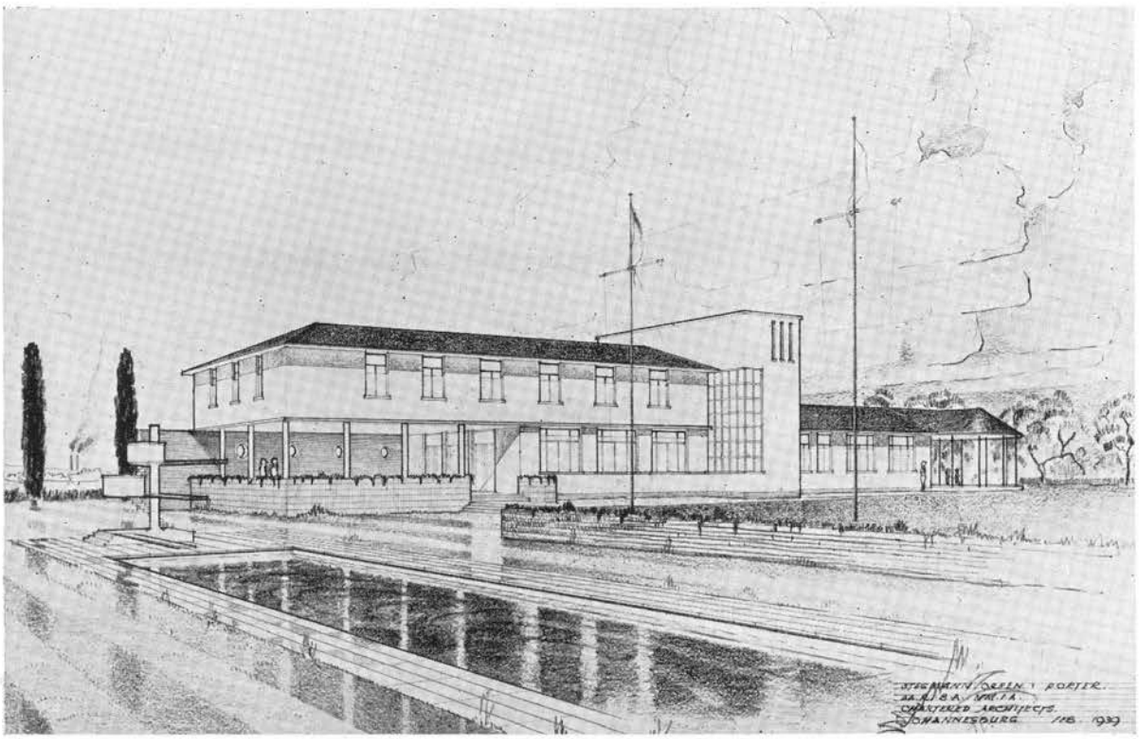
The total cost of the two buildings was approximately £30,600.



A GENERAL VIEW OF THE BRINE ROOM *showing float-control liquid-ammonia feed to evaporators and surge vessel, three thermostats (on far wall) and liquid receivers on floor.*

The Boksburg Jubilee Home

CRÊCHE & CHILD WELFARE SOCIETY CENTRE



WORK has started on the foundations of the new Boksburg Jubilee Home, an institution which is to serve the needs of the indigent of the town through the offices of the Child Welfare Society.

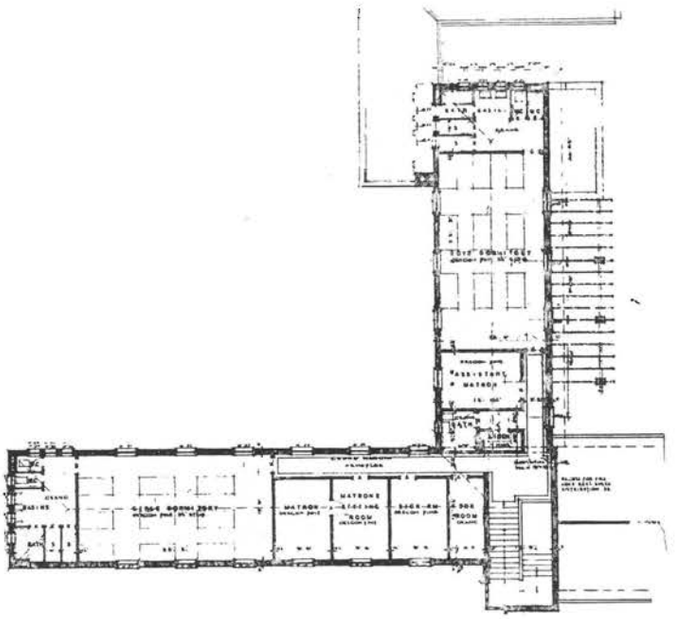
Though a comparatively small building involving the expenditure of about £7,000, the Home is deserving of special interest as little work of this type has been done in this country. It will not only serve the cause of charity, but will prove a very fine example of what can be done for the amelioration of the more unfortunate elements of society by enthusiastic altruism on the part of other citizens. It is interesting to note that the Home is to be erected at the cost of materials and labour only. Money for the purpose was donated by the citizens of Boksburg, and those able to supply materials and furniture will do so at cost. In addition, the site was given by the Boksburg Municipality and the services of the architects and builders were free. The architects are Messrs. Stegmann, Orpen & Porter and the builders Messrs. D. F. Corlett (Pty.), Ltd.

The idea of erecting a Home first occurred in 1936 when Boksburg celebrated its jubilee and the Coronation of King George VI. The work of organising and collecting funds was carried out by a Committee of Management under the chairmanship of Mr. C. Benham. The Committee was elected by the citizens of Boksburg.

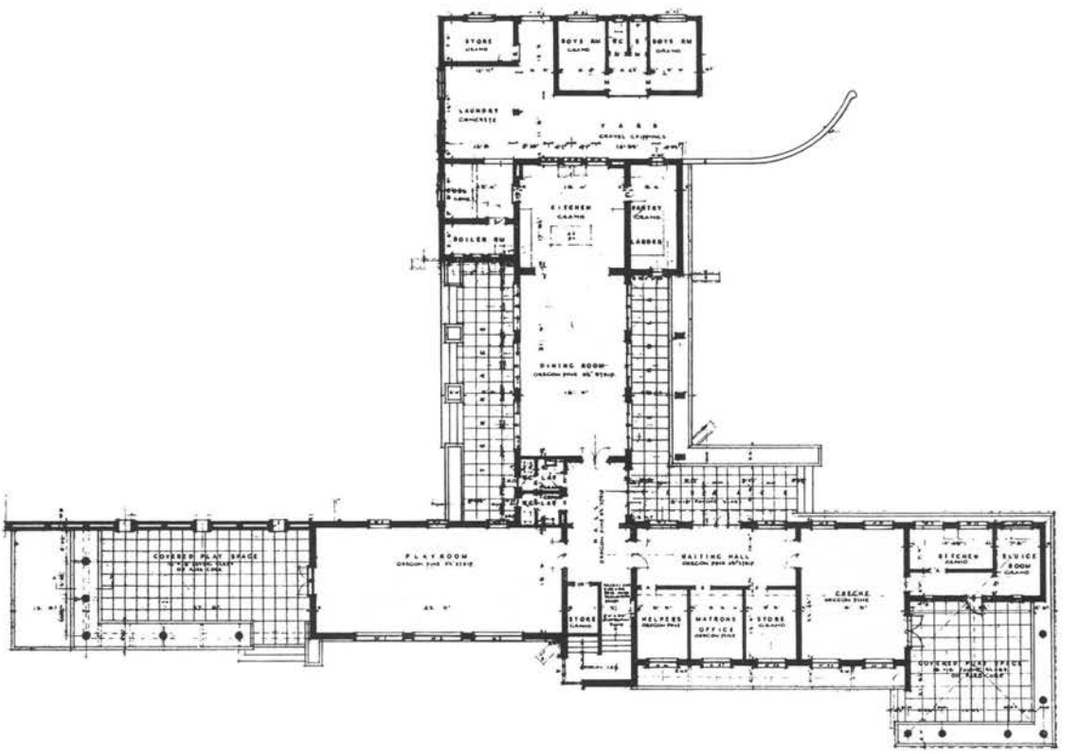
In dealing with the design of the Home, it is necessary to set out first the purposes it will have to serve. The Home will have three main services. In the first place, it will be a centre for all child welfare and benevolent work in Boksburg for the distribution of clothing, foodstuffs, etc. In the second place, it will provide a temporary home for children whose parents are undesirable, or who have been deprived of parental care and control through death, illness or desertion. Such children will be taken in and cared for until they are placed permanently in some other established home. Delinquent boys up to the age of 12, and delinquent girls up to any age will also be cared for until the magistrate considering their case decides what is to be done with them. The child who has to be discharged from hospital in a convalescent state to a pauper home will receive special treatment to consolidate his or her recovery. The third main purpose the Home will serve is that of a crêche and play school for children whose mothers have to go out to work.

The Jubilee Home is to be situated in Boksburg North on a site overlooking a wide grass plain separating Boksburg and Dunswart. One of the main factors in the choice of the site was that in time the Boksburg Municipality intend erecting a sub-economic housing scheme in the immediate vicinity. The Home will therefore be nearest to that section of the community to whom it will be of the most use.

Boksburg Jubilee Home



FIRST FLOOR.



GROUND FLOOR.

Constructional Details and Design

THE building is T-shaped in plan, and faces north. It will have a frontage of 180 feet and a depth of about 120 feet, and is centrally situated on a site comprising about 16 stands, so that ample playing-ground space is assured. The west wing is single storey, the remainder being double. The design is on simple modern lines, external treatment comprising plaster brightened by the use of light brown facing brick on the staircase tower, the verandah, flower boxes and the wing wall protecting the covered play space on the east wing from the cold winter south winds. The corner window in the stair tower achieves a smart asymmetric effect with the further advantage of admitting the bright morning sunlight into the stair hall, but shielding it from the hot midday and afternoon sun. The roof will be slate-covered, with wide eaves all round.

The plan is self-explanatory; the only point that need be mentioned is that the architects were faced with the necessity for providing the best possible design for the least possible cost.

Points worth noting are as follows: The dining-room, which is 18 feet wide by 31 feet long, is so designed in conjunction with the kitchen that it may be used for demonstration purposes. It is the intention of the Welfare Society to give cooking demonstrations to young mothers as well as lessons on controlling the family budget. The double-swing glass-panelled doors opening out on to the terrace on one side and the pergola on the other form a useful feature, enabling the dining-room to be used for evening functions. It is the intention of the Society to hire this dining-room out to the Boksburg Girls' Club for evening functions.

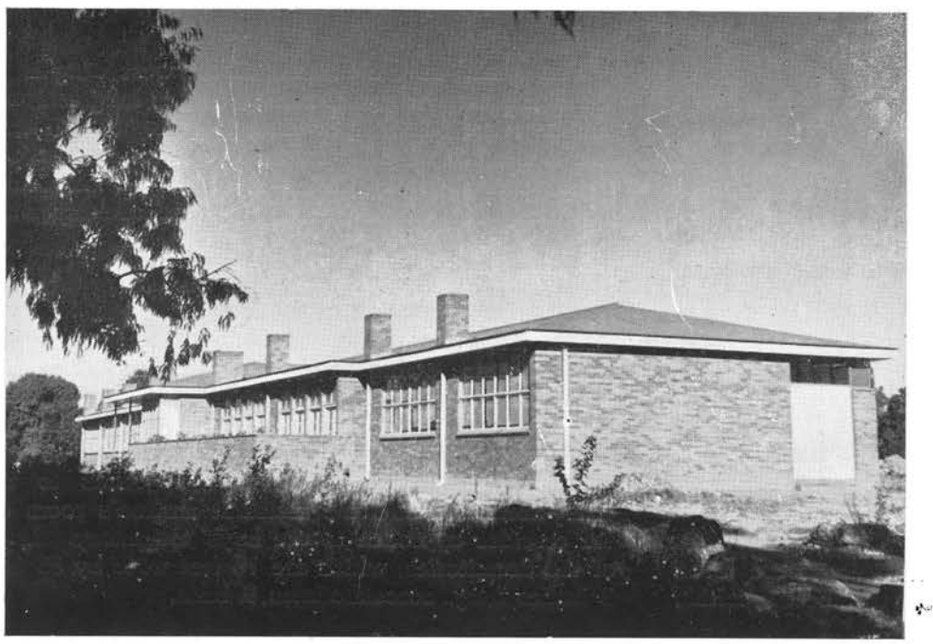
The crêche on the extreme of the west wing is 16 feet 9 inches wide by 22 feet 4½ inches long and will accommodate some 20 or more infants. It will contain a number of cots, but many of the infants will be old enough to play in the covered space adjoining. The small milk kitchen and sluice room are important accessories.

The most important provision on the upper floor is the wide separation of the boys' and girls' dormitories. This is a highly essential feature in a Home of this nature owing to the fact that many of the adolescents, particularly the delinquent children, are almost without moral restraint. It is partly a further precaution that the matron's dormitory and sitting-room are situated off the corridor approach to the girls' dormitory and the assistant matron's room off the corridor approach to the boys' dormitory. Each of the dormitories, which are 18 feet wide by 33 feet 3 inches long, accommodates 9 beds.

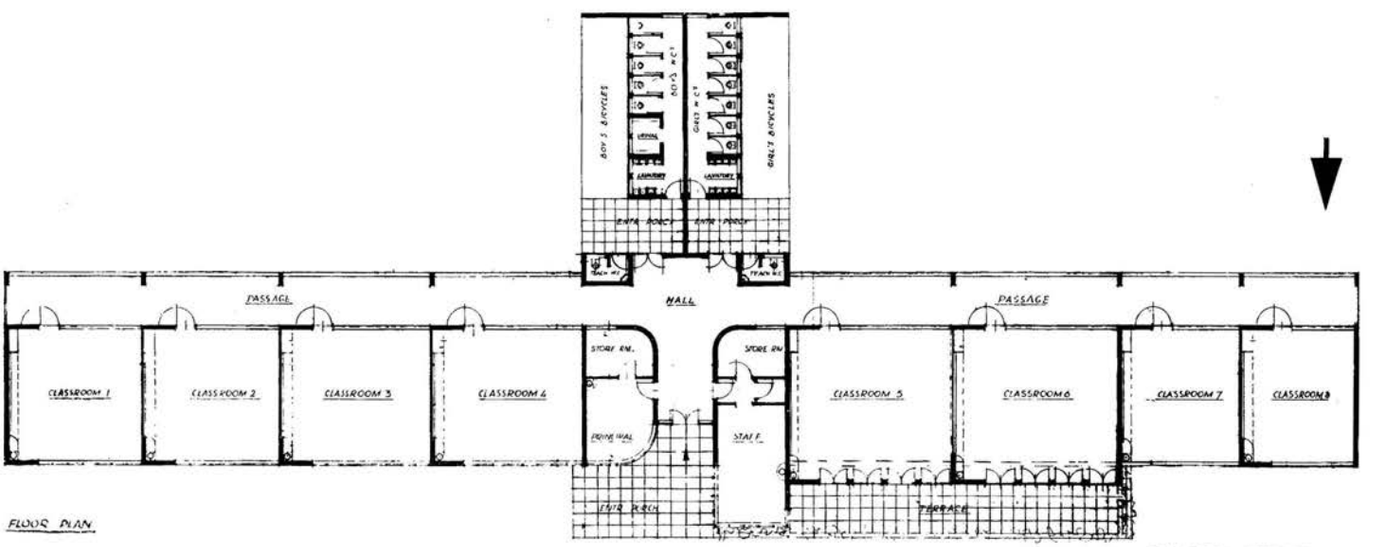
Other accommodation includes the matron's office and an additional office for the use of members of the Boksburg Welfare Society or any Probation Officer visiting the Home. The room adjacent to the matron's office will be used to store clothes, blankets, etc., donated to the Home. In time, means will be provided for the mending of all second-hand garments given to the Home.

The interior treatment is simple, comprising plaster walls, stained wood-work and wood floors. The Home will be under the management of a matron and assistant matron assisted by a Native maintenance staff.

General Brink Primary School - Roberts' Heights



VIEW FROM N.-W. CORNER.



FLOOR PLAN.

ORIENTATION IN SCHOOL - BUILDING DESIGN :——

★

A Neat Example Illustrating One Aspect of the Controversy of North *vs.* South Facing Class-rooms——

THOUGH completed some little while ago, the new General Brink English and Afrikaans medium primary school at Roberts Heights offers an interesting subject to architects on account of the principles involved in its design. These principles have become controversial following a recent ruling of the Transvaal Education Department emphasising the desirability of south-facing class-rooms as opposed to the more conventional north-facing rooms. It is not the purpose of the author of this article to take sides in this matter. The intention is to point out how the disadvantages of a northerly orientation have been overcome in this particular building, and to illustrate that architectural design can off-set physical disadvantages without discountenancing conventional practice.

As will be seen from the reproduced photograph, the building is laid out with the class-rooms along a common axis, which arrangement, with the central asymmetric entrance porch, results in clean modern lines and an appearance of neatness and unity. The accommodation provides six class-rooms, 2 grade class-rooms, a principal's office, a staff-room, a lavatory block for boys and girls, two store-rooms, cycle sheds and an outbuilding for Natives.

The building is brick-built of 2⅝-inch Kirkness bricks. The outside walls are in a deep red brick, facing bricks being used inside. The roof is pitched with wide overhanging eaves, and is carried over the central entrance porch as a single unit. All the windows are in purpose-made metal frames, except in the infant or grade class-rooms in the west wing. These class-rooms have wood, glass-panelled white-painted doors opening out on to a small open-air terrace surrounded by a high flower wall. The purpose of this terrace is to allow the children the benefits of direct sunshine and the open air, while keeping them within the control of the teacher.

The façade is brightened by touches of colour in small but important constructional members. The metal supporting column in the entrance porch is painted a bright red, and the entrance doors are painted blue. These doors are of the double-swing, flush-panel type set in between sidelights carried right down to the floor. There is a large transome light over.

The Class-rooms : PARTICULARLY neat design characterises the class-rooms, which embody a number of noteworthy points.

The blackboards are situated on the east wall of each class-room, and are protected from discomforting reflections by being recessed in a deep bay, so that the wall above door height projects over. On the north side the board is flanked by a built-in slow-combustion stove, and on the south by a cupboard let into the bay. The wall opposite the blackboard is distempered white above the facing-brick dado, and serves as a hanging space for permanent pictures and drawings. The south wall has a slightly recessed and framed pinning board of donnaccano board running the full length of the wall. All the doors are flush-panelled and painted an attractive grey. The floor is deal. The ceilings throughout the building are of white donnacanno board.

A word should be said about the class-room windows. These are purpose-made metal frames, each being divided into an upper and lower section. The upper section is bottom-hung to open inwards and the lower section is pivotted horizontally. Each section has its own blind fitting, so arranged that the blind clings to the window regardless of its position.

MAIN ENTRANCE.

This arrangement, in conjunction with the blinds, enables the windows to be opened regardless of the position of the sun. The pupils, therefore, are protected from direct sunlight, at the same time receiving full ventilation. The bottom-hung section prevents a direct draught playing on the pupils.

In addition to the external windows, there are clerestory lights in the south wall of each class-room to provide additional lighting and cross-ventilation.

The Plan: PARTICULAR interest attaches to the plan because of the differences of opinion now existing on the problem of north-facing versus south-facing class-rooms. It will be remembered that the Transvaal Education Department, in its handbook, "Suggestions Concerning Planning of School and Hostel Buildings," has emphasised that:

> .... *"the fallacy persists that the orientation of a school building to have its class-room windows north and east is the best arrangement in cold and temperate climates to make effective use of sunlight for light and warmth.*
>
> *"In effect this means that doors, open corridors and quadrangle face south and west, open and exposed to winds from these points of the compass and are completely shut off from the sun. On the high veld this means that at certain times of the year extreme variations of temperature between class-rooms, corridors and quadrangle are prevalent, and that cold draughts and air currents are catered for. In addition, direct sunlight striking through the exposed window space upon pupils and their desks in schools has to be screened off by means of blinds and curtains, the primary object of the original orientation being thereby defeated."*

As the General Brink School was designed and built before this principle was set out, it is interesting to detail how the architect defended "the primary object of the orientation."

From the plan it will be noticed that the corridor running along the south side of the building is of exceptional width, and is divided into a series of bays opposite each class-room. These bays serve as cloak-hanging spaces, and obviate the necessity for providing costly cloak-rooms. The primary object of this corridor, however, is to protect the class-rooms from the strong prevailing south-east winds in winter. Lighting and modified ventilation is ensured by a long continuous line of clerestory lights which admit a comfortable degree of ventilation even on the most windy days. The ends of the corridor are closed by doors provided with large transome lights, this provision allowing future extensions when necessary. It will be seen, therefore, that this arrangement protects the class-rooms from the cold south-east winds in winter, and avoids extreme temperature variations between the class-rooms and corridors. In addition, the plan of the building avoids the inclusion of quadrangles, the cycle sheds and lavatory block projecting out in the rear actually providing a wind-break against diagonal winds. The north-facing class-rooms are left to the warmth and brightness of the sunny side.

Regarding the disadvantage of direct sunlight upon the pupils, it is fair to point out that this condition prevails generally in winter months. During the summer months the sun is near the zenith. Consequently, any direct sunlight likely to strike through the windows is shielded by the wide overhanging eaves. During the winter months the warmth of direct sunlight is needed by the pupils. To prevent eye-strain due to intense light, the light opaque blinds may be pulled down, thereby controlling the light without sacrificing any of the warmth.

In "defending" the primary object of the school's northward orientation, the architect, Mr. A. V. Nunn, has provided a useful contribution to the school-building problem.

The Quantity Surveyor for the work was Mr. A. Springthorpe.

Among the contractors to this school were the following:—

J. P. Lamb, Pretoria (General Contractor).
Horak & Gravenstein, Pretoria (Painters).
John J. Kirkness, Ltd., Pretoria (Bricks).
Kennard, Buchel & Co., Pretoria (Plumbers).
Public Works Department (Electrical Installation).

SOME TIMBERS OF THE AFRICAN CONTINENT

IN the September issue of "Public Works of South Africa" a comprehensive article on South African timbers was published. Because of the interested reception given this article by our readers we have decided to extend the survey to a variety of timbers found on the African Continent. The subject is one of practical rather than academic interest, for while a number of these timbers are already being used for joinery and building there are other species suitable for the same purposes awaiting economic development and the test of experience. In addition to this interest, the subject is particularly important at the present time when hostilities in Europe must cause architects and builders a certain amount of worry about the possibility of shortage in timber supplies.

IN reviewing the production of African timbers several facts have to be taken into account, as they illustrate at once the possibilities and the limitations of this source of supply.

The first of these is that the exploitation of many of the African timbers has only just begun. It is obvious, therefore, that while a number of species are now generally available, other species just as valuable have to await the economic exploitation of their areas before they become available for commercial uses on a considerable scale. Other species, again, are found only in limited quantities.

Some of the difficulties facing timber production in Africa are of interest, and explain the apparent inertia which has held back the industry. That these difficulties are gradually being overcome augurs well for the industry, and will result in the introduction of many beautiful timbers for building and joinery purposes.

The greatest of these difficulties is the distance of the majority of forests from areas of economic importance. Exploitation has to be carried out in wild country, in most cases many miles away from civilisation. This factor alone places a premium on production costs, necessitating higher wages and heavy transportation costs because of the long distances involved. It is essential, in many instances, for vested interests to lay down their own railway lines.

A further difficulty arises out of the fact that not very much is known at present of the commercial qualities of many of the timbers, and seasoning is, in many instances, an uncertain factor.

African timbers may be air-dried, but this takes a considerable time, sometimes 10 years for the larger logs felled in East Africa. Owing to the differences in the climate of the Union, particularly the drier areas of the Transvaal and the Orange Free State, and the forest areas where the timber is felled, artificial seasoning is essential for timbers imported into this country. This requires a large capital outlay on kilns.

Many of the imported timbers are more fortunately placed. Burma teak, for instance, has to be floated down miles of river from the inland forests to the mills on the coast, requiring several seasons of floods for the journey. During this period the natural sap is washed out of the logs so that artificial seasoning is not necessary. In general, it can be said that teak arrives in this country in a partly seasoned condition owing to the length of time that elapses between the felling of the logs and the arrival of the timber here.

In contrast to this, timber of the same dimensions sent from, say, East Africa, would normally arrive in a much wetter condition. The organisation specialising in the importation to the Union of these timbers, however, takes special precautions to ensure that it is air-dried before despatch. The timber is then artificially seasoned in kilns to condition it finally for use in those parts of the Union where the climate is more severe.

So far as African timbers are concerned the restrictions imposed by kiln-drying costs and freightage are countered to a degree by the importation into the Union of only select timbers, thus eliminating the waste factor.

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The following is a list of the more important timbers found on the African Continent:

Kenya Timbers: IN East Africa, true forest conditions prevail. The temperate climate, due to the high altitude, the high rainfall and favourable soil conditions has resulted in the growth of magnificent timber trees. In the characteristic Kenya forests, for example, the height attained by trees is from 80 feet to 120 feet with clean boles clear of all branches for 60 feet and upwards. As a consequence, East African timber is unusually free from knots and similar defects, and the obtaining of wide boards presents no problem. Exceptionally long lengths can also be obtained, but at some extra transport cost.

Owing to the fact that East African timbers occur in large forest belts, the cutting of which is systematically controlled by the Government which allocates a portion of the royalties to the replanting of indigenous trees, there is no difficulty whatever in securing large quantities of any East African timber selected for important works. Continuous supplies are not difficult to secure. The position is generally improved by the fact that all large Kenya timber mills are grouped into a co-operative society, the total stocks and resources of which are available for the execution of all orders booked by any individual or mill.

In view of this it may appear strange that East African timbers have not been more widely used in the Union. Three main reasons are responsible for this. The first is that until the time of the Johannesburg Empire Exhibition no effort had been made by the East African timber industry to draw the attention of Union consumers to its products, and even after the Exhibition no serious provision was made to cater for the Union market, even though the display on the Exhibition created an excellent impression. The second reason is that climatic conditions in South Africa, particularly in the Transvaal, are unusually severe and demand special seasoning for timbers intended for general use. Initial experiments have proved that wood, which for certain East African conditions was adequately seasoned, was liable to give considerable trouble by distortion, warping and splitting when exported to the Transvaal. This difficulty has now been eliminated by the establishment in Johannesburg by certain trading interests of a timber yard and seasoning kilns similar to the type widely used in England and on the Continent for similar purposes. East African timber, so seasoned, may now be used with confidence for the best decorative and other specialised purposes.

The seasoning of these timbers is now under the control of an expert brought from overseas. This system has enabled considerable quantities of a representative selection of leading East African timbers to be kept constantly available for immediate supply, with the further advantage that maximum moisture contents can be guaranteed.

High transportation costs are the third drawback, previously mentioned as one of the factors imposing a restriction on the development of the African timber resources. East African timbers come from forests situated far away from the coast, and this entails a long rail journey. Fortunately, the coastal voyage from East Africa to the Union is one of the shortest and safest under conditions prevailing to-day. The difficulty of transportation costs, however, is being countered to some extent by the virtually complete elimination of the waste factor, only timbers of selected and first-grade quality being sent down. Thus an important item of expenditure is reduced to a minimum.

The range of timbers obtainable from East Africa is unusually wide. Most of them are classed technically as hardwoods, i.e., they are not Conifers. A number of them are capable of serving the same purposes for which timbers such as Oregon Pine and Western Red Cedar are widely used. In addition, Mvuli and Camphor can be safely used for purposes served by timbers of the same category as Burma teak. For decorative purposes the special Meru timbers can be favourably compared with most panel woods. The following are some of the more important Kenya timbers:—

MORU *(Vitex keninsis):*

This timber weighs about 30 lb. per cubic foot. It is light grey and dark grey in colour, shading almost to black, with an attractive grain and figure. It works, seasons and polishes well, and is not quite so hard as English oak.

It is used for panelling, doors, windows and high-class furniture, but it is somewhat too soft and too light in colour for counters.

MURINGA *(Cordia Holstii):*

Weighing about 27 lb. to the cubic foot, Muringa has, when oiled, a pink-brown colour varying to plum. Its natural marking and grain is attractive, but it is somewhat open in texture. It is a very easy timber to work and season.

It is used for panelling, doors, windows, cupboards and all furniture not subject to severe handling.

MUCHICHIU *(Premna maxima):*

Muchichiu weighs about 38 lb. to the cubic foot. Its colour is light grey tinged with green. Being naturally an oily wood it is very durable and can be readily stained. When polished, it takes on a bloom resembling Stinkwood. It is straight-grained and close-textured. It seasons well and is an ideal cabinet wood.

It is used for counters, tables, desks and high-grade strip flooring.

MVULI *(Chlorophora excelsa):*

With a weight of about 47 lb. to the cubic foot, Mvuli is a light golden brown wood, striped with darker markings. Selected pieces resemble Stinkwood. It has about the same hardness and durability as Burma teak, but is easier to work. The grain is somewhat open and its working requires the use of sharp tools.

It is used for high-grade furniture, stair cases, counters, desks and chairs, standing severe handling well.

CEDAR *(Juniperus procera):*

This is a pencil Cedar weighing about 34 lb. to the cubic foot. Its colour is light brown, sometimes streaked with purple. It is an ideal cabinet timber, working and finishing very well, and is slightly harder than *Juniperus Virginiana*. It is highly aromatic and is therefore repulsive to insects.

It is used for bookshelves, cupboards, linings, etc., and also for solid furniture.

CAMPHOR *(Ocotea Usambarensis):*

Camphor weighs about 39 lb. to the cubic foot. Its colour is light brown to dark brown. It has some natural figure, works well, but is rather open-grained. It takes a good polish, is aromatic and therefore insect-proof.

It is used for general utility cabinet work and is recommended for tables, chairs, etc. It is a fine flooring timber and resists hard usage.

PODO *(Podocarpus):*

Weighing 31 lb. to the cubic foot, Podocarpus is cream to pale brown in colour, with a straight grain and fine texture. It is entirely free from smell or taint. It works well and finishes cleanly. It is a high-class softwood requiring the use of thin, blunt-pointed nails.

It is a good general purpose wood which may be specified for the same purposes as Oregon Pine. It is excellent for shelving, casing and flooring.

MUSHARAGI *(Olea Hochsteteri):*

A heavy timber weighing 59 lb. to the cubic foot. Its colour is light brown with dark brown markings. It is hard and durable, but is wasteful in conversion owing to malformed trees. Kiln seasoning is essential for best results. The timber then behaves well.
in the Union.

It is used for parquet flooring and short-strip flooring.

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Rhodesian Timbers: BESIDES the forests in the Zambesi and north, there are large forest reserves being exploited in Southern Rhodesia. This State is 152,000 square miles in extent, and 60 per cent. of this area is more or less covered with trees and shrubs. With the exception of a small area, however, where evergreen forests occur in specially favoured spots, the forests are generally of the savannah type. Merchantable forests occupy more than 18,300 square miles, or more than 25 per cent. of the total wooded area.

The chief timbers from these regions are as follows:

RHODESIAN TEAK *(Baikiæa plurijuga):*

The weight per cubic foot of this timber is approximately 70 lb. green. When kiln-dried to 10 per cent. moisture content its unit weight is 54 lb. It is a hard, strong, attractively grained, durable wood used very largely for sleepers, parquet flooring, for which it is very suitable, and veneers.

RHODESIAN MAHOGANY *(Copaifera coleosperma):*

The unit weight of this timber, green, is 65 lb. to the cubic foot, and 45 lb. to the cu. foot when kiln-dried to 10 per cent. moisture content. It is a very handsome timber of reddish colour, attractively marked. It is used for floor blocks, framing and panelling.

MUKWA *(Pterocarpus angolensis):*

Known as Kejaat in the Union, where it is also grown, this timber is a durable, attractively grained brown wood somewhat similar to imported teak, but usually better figured, and is suitable for all purposes where teak is used. Its weight is 40 lb. air-dry.

MGOMA *(Ricinodendron rautenenii):*

This is an exceptionally light and soft whitish timber weighing 11 lb. to the cubic foot when kiln-dried to 11 per cent. moisture content. It is used for insulating purposes, cores and backings.

Syringa and Chamfuta or Pod Mahogany, also obtainable from Rhodesian sources, are not now supplied for general purposes.

During the initial stages of the exploitation of Rhodesian teak and Rhodesian mahogany it was found that their weight, greatly in excess of the imported timbers, was against their general adoption. These two timbers, however, are now being cut in the form of veneers and made up into plywoods, and are being used extensively for shop and office fittings of modern construction. Besides an attractive appearance they have the advantage of being impervious to attack by white ants, a factor of great value in Southern Africa. The solid timbers, therefore, may be safely used below as well as above ground.

Plywoods made from indigenous woods, however, are at a price disadvantage compared to imported plywoods. This is due to the fact that in South Africa production costs are considerably higher than overseas. Railage rates are also a big factor in putting up the price in this country. In their solid form these two timbers are excellent for flooring and are being used extensively for this purpose. In the form of parquet flooring they are very attractive and wear exceptionally well.

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Nyasaland: THERE is very little forest in Nyasaland. The area of the protectorate is 43,608 square miles. A large proportion is mountainous or hilly country rising rapidly from 160 feet in the southern end to a general altitude varying from 2,000 to 4,000 feet. The area of commercial timber forest is about 5,500 acres, other forest areas totalling 13,000,000 acres. Owing to the difficult topography of the protectorate and its situation, the extraction of timber is very costly, and therefore export is not commercially practical at present so far as the Union is concerned.

The following are a few of its chief timbers:—

AFRICAN MAHOGANY *(Khaya Senegalensis):*

This timber is obtained from the banks of streams. It is durable and used mostly for general building purposes.

MLOMBWA *(Pterocarpus Angolensis):*

Used for ship decking, for which purpose it is admirably adapted. It is also used for furniture, and is a very durable wood, known as kejaat in the Union.

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Tanganyika: TANGANYIKA has an area of 365,000 square miles, and of this approximately 2,700,000 acres are under forest. The forests supply both Conifers and hardwoods. Among the Conifers there are two species of yellowwoods. The main Conifer timber is Cedar *(Juniperus procera)*. Among the hardwoods are Iroko, *(Chlorophora excel-*

sa) known as Mvuli in Kenya, Camphor, as well as *Afzelia cuanzensis* known as Chamfuta, *Pterocarpus Busei, Pygeum africanum* and *Parinarium Holstii.* Ebony is plentiful near the coast.

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Uganda Timbers: IT can be generally stated that Uganda timbers have not yet come into prominence, chiefly because of the long railage to the coast and the difficulties of internal transport. The forests, therefore, have not been combed for the very best trees. Timber trees such as the mahoganies are available in very large sizes. The majority of the valuable timber species of the Protectorate are found in the Tropical Rain Forest, as it is called, occupying areas with a rainfall between 50 and 90 inches a year, though usually from 50 to 70 inches. These forests contain many West African and Central African species, and resemble the second zone of drier type that occurs on the West Coast behind the wet Delta Forests.

The following timbers do not by any means represent all those available from this source. They have been selected as among the most useful timbers available or likely to be available for import into the Union, should the timber position here at any time warrant the consideration of any source of supply, regardless of transportation costs now held to be prohibitive. At present, however, so far as the Union is concerned, the following list has more an academic than a practical importance.

MUJWA *(Alstonia congensis)* sometimes called Paternwood or Stool-wood:

These trees attain a height of 130 feet and about 12 feet mid-girth. The species is confined to tropical Africa from Senegal to the Cameroons eastwards from the Congo to Uganda. It occurs rarely in the Sudan.

It is an excellent light-coloured and light-weight hardwood which, for certain purposes, can be used as a softwood substitute, and is suitable for interior joinery and fittings of all kinds including mouldings and corestock for veneers, wooden utensils, matches and box-making.

It has two drawbacks, however. One is the occurrence sometimes of slit-like radial passages nearly ½" in height, sometimes 4", reducing the strength and impairing the appearance of the timber. The other is its low resistance to attack by borers. Its durability, therefore, is low. On the other hand the timber readily absorbs preservatives so that the second drawback may be off-set.

The wood is nearly white when cut, but darkens to a pale buff colour on exposure. At 14 per cent. moisture content the wood weighs 26 to 28 lb. per cubic foot.

MUHIMBI: Uganda Ironwood *(Cynometra Alexandri):*

This is a large well-spreading tree attaining a height of over 120 feet with a relatively short bole and large branches. It is confined to Uganda and the Belgian Congo, its distribution apparently being limited by altitude, as it is not found above 4,000 feet. It is found in many forests within the above limitations and represents a larger standing volume than any other species in the Protectorate.

Its extreme durability has enabled it to be used for bridge-building timbers, mine-shaft guides, mile posts and railway sleepers. The wood is not unattractive, being reddish brown in colour with light and dark markings. Its weight is against anything but heavy constructional uses. Its specific gravity is ·88. At 15 per cent. moisture content its weight is 55 lb. per cubic foot.

CRABNUT *(Carapa grandiflora):*

This is a useful Mahogany-like wood, but is slightly too heavy and tough to be widely popular. It is comparatively plentiful only in the western forests of Uganda. It is a good class of wood, but the small size of its stems mitigates against extensive use. It is suitable for joinery and building. On exposure, it acquires a reddish brown colour of a deep mahogany tone and often has a golden lustre. It has a rather close grain, it is easy to work, but needs care in planing on account of the interlocking grain. It polishes well after filling. The seasoned heartwood is only moderately resistant to termite and fungus attack. It is tougher and harder than Uganda Mahogany. Specific gravity equals 0·65 at 15 per cent. mostture content.

MUKUSU: Budongo Mahogany *(Entandrophrogma angolense):*

This is a deciduous tree attaining a height of 160 feet with a clean bole of 60 – 80 feet and a girth of 12 – 14 feet above buttress. It is a timber of first-class importance. Unfortunately it occurs only in the Bunyoro Forests, where it is moderately plentiful but of rather local distribution.

Though pale-pink when freshly cut, the heartwood usually darkens on exposure to a deep reddish-brown, the sapwood remaining pale. The interlocking grain produces a striped figure. It is uniform and of medium texture. It is moderately heavy and works readily by hand or machine tools and a good finish is obtained. Darker colour timber has a rather better working quality than the lighter.

There is considerable variation in colour and texture of the timber from different trees, the heartwood of some logs being pale-pink and not the typical reddish-brown colour. The darker variations have better working qualities and kiln-dried timbers give a superior finish to the air-dried. It weighs 36 lb. per cubic foot at 15 per cent. moisture content. The timber is sometimes confused with Mufumbi, but Mukusu is to be preferred for furniture.

MOIVU *(Entandrophragma cylindricum)* Sapele:

This is a deciduous tree attaining a height of 180 feet with clean boles of between 80 and 90 feet, 100 to 110 feet not being unusual. It is

distributed in West Africa from the Gold Coast to the French Cameroons, eastwards from the Belgian Congo to Uganda, where it grows only in the forests of Buganda and Bunyoro.

Sapele has yet to establish its individuality and importance. It is of the same species as the well-known Sapele of Nigeria and is known elsewhere as Scented Mahogany. In East Africa market development is at present hampered by lack of any local veneer factory. There is a long rail haul to the coast, further restricting the export trade. Nevertheless the possibilities of export trade will be increased when the selection and correct seasoning of the more valuable stripey logs is understood. At present the timber is used for joinery and occasionally furniture. It is moderately hard and heavy and is strong in behaviour. This suggests that the manufacture of veneers might be more suitable than attempts to use the timber in the solid, yet the low cost of labour would permit the development of local trade in solid furniture provided care was taken with seasoning. The tree grows to enormous proportions and the finest logs are obtainable, and tests so far have shown that the timber may prove to be more valuable than other mahoganies. The wood is pink when freshly cut and darkens to a brownish red on exposure, and is distinctly browner than the wood of Uganda Mahogany. It weighs 39 lb. to the cubic foot at 13·5 per cent. moisture content.

MUYOVU *(Entandrophragma excelsum):*

This is a deciduous tree attaining 120 to 140 feet in height with a girth of about 12 feet above the buttress. This species is distinctly recorded only from the forests of Kigezi and Western Ankole in Uganda, but it is probable that it occurs in parts of Tanganyika Territory and in the Belgian Congo. It is the least familiar of the Mahoganies of Uganda. It is a fine, valuable mahogany of good colour and texture and will be one of the more valuable of the contry's timbers when the development of the district permits economic exploitation. The tree grows to a very large size and is moderately obtained in the forests where it occurs. At present it is used only for joinery in small local townships. It is a pink brown when freshly cut, darkening on exposure to a typical mahogany colour. The grain is interlocking, but does not give a rise to the close and regular stripe as in Sapele. Weight equals 35 lb. per cubic foot at 15 per cent moisture content. The forests in which it is found have not yet been exploited for timbers.

MUNYAMA: Uganda Mahogany *(Khaya anthotheca):*

Uganda Mahogany is another deciduous tree attaining a height of 140 feet to 180 feet with a girth of 8 to 12 feet above the buttress. This timber has not the " quality " of some of the other Mahoganies, but it has three good claims to the most important economic position. In the first place it is the most plentiful of the Mahoganies in the East African territories, though it is confined to the Bunyoro forests of Uganda. In the second place, it is easily extracted, excellent in conversion and is easily seasoned. In the third place, it is mild in working. It is expected to establish a basic position in the timber trade of East Africa, and the development of an export trade is very probable, even though hampered by transportation costs. It weighs 33 to 35 lb. per cubic foot at 14 per cent. moisture content.

MUFUMBI MAHOGANY *(Entandrophragma utile):*

This is a deciduous tree attaining a height of 150 feet to 170 feet with a mid-girth of 9 to 12 feet. Its distribution occurs from West Africa through the French Gabon to the Ivory Coast and in Uganda.

It is an excellent timber falling into the class of the heavier Mahoganies. It has a fine and even texture and is very suitable for the best class of joinery and furniture. It is similar to Sapele wood, but the stripe is not so narrow. It is favoured for railway coach work. It has a closer texture and is heavier than Budongo Mahogany, but requires less filling before polishing, and is only slightly more difficult in seasoning.

When freshly cut it is pink in colour, darkening on exposure to a fairly reddish-brown or purple-brown, the sapwood remaining pale-brown. The grain is interlocking, producing a stripe on the radial surface, which is generally rather regular in width and seldom very narrow. It weighs about 41 lb. to the cubic foot at 15 per cent. mosture content.

[For the above information on Uganda trees full acknowledgement must be made to the reference work, " Fifteen Uganda Trees," by W. J. Eggeling, B.Sc. (For.) Edin., and C. M. Harris, B.A. (Oxon), published in the series " Forest Trees and Timbers of the British Empire," and edited by L. Chalk, J. Burtt Davy and A. C. Hoyle, Imperial Forestry Institute, Oxford.]

Tenders Invited

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

AIR-CONDITIONING AND CENTRAL HEATING.

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

Extract fans, motors and starters for National Art Gallery, Cape Town: supply and delivery (P.W.D. tender 460): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Cape Town. **15th February.**

Ventilating plant for Parachute Room, Zwartkop Air Station, Pretoria: supply, delivery and erection (P.W.D. tender 466): P.W.D., Pretoria (Room 531, 'phone 5477). **22nd February.**

BRIDGES AND MATERIALS.

Sandspruit Bridge (Volksrust District), consisting of substructure and reinforced concrete superstructure in four 50-ft. girder spans (P.W.D. tender 478): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Johannesburg. **7th February.**

BUILDINGS AND ALTERATIONS, ETC.

R.N.V.R. Drill Hall at East London (P.W.D. tender 471): P.W.D., Pretoria (Room 531, 'phone 5477), District Representative, P.W.D., Port Elizabeth, and Inspector of Works, P.W.D., East London. **1st February.**

Additions to Nurses' Home, Grey's Hospital, Pietermaritzburg (P.W.D. tender 475): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Pietermaritzburg. **7th February.**

Additions to Public Offices at Springbok, C.P. (P.W.D. tender 480): District Representative, P.W.D., Cape Town, and Magistrate, Springbok. **1st February.**

Military Camp at Potchefstroom: Contract No. 4 — Mess Blocks (P.W.D. tender 476): P.W.D., Pretoria (Room 531, 'phone 5477) and District Representative, P.W.D., Johannesburg. **8th February.**

Alterations and additions to Trade School at Knysna (P.W.D. tender 479): P.W.D., Pretoria (Room 531, 'phone 5477) and District Representative, P.W.D., Port Elizabeth. **8th February.**

Zastron School Hall: Secretary, School Board, Zastron. **2nd February.**

Additions to Oudtshoorn Training College: Messrs. Simpson & Bridgman, A.R.I.B.A., chartered architects, Oudtshoorn. **13th February.**

Additions to North Primary School, Parow, C.P.: Messrs. Black & Fagg, African Life Building, 85, St. George's Street, Cape Town. **13th February.**

Additions to Jamestown Secondary School Buildings, Jamestown, C.P.: Secretary, School Board, Aliwal North; and Messrs. Farrow, Stocks & Farrow, Adla House, Terminus Street, East London. **13th February.**

Carnarvon High School Hall: Mr. J. Z. Schuurmans-Stekhoven, Union House, Queen Victoria Street, Cape Town. **13th February.**

Additions to Amalinda Primary School (East London Division): Messrs. Farrow, Stocks & Farrow, Adla House, Terminus Street, East London. **13th February.**

Additions to Victoria West High School: Messrs. Black & Fagg, 85, St. George's Street, Cape Town. **13th February.**

Additions to Vanwyksvlei Secondary School (Carnarvon School Board Division): Secretary, School Board, Carnarvon; and Mr. J. Z. Schuurmans-Stekhoven, Union House, Queen Victoria Street, Cape Town. **13th February.**

Additions to Pinelands Primary School, C.P.: Mr. L. Marriott-Earle, Colonial Orphan Chamber Building, 4, Church Street, Cape Town. **13th February.**

Class-rooms at William Pescod Coloured High School (Kimberley Division): Messrs. Greatbatch & Timlin, Church Street, Kimberley. **13th February.**

Additions to Preparatory School, Goodwood (Cape): Mr. J. Morris, Union Castle Building, Adderley Street, Cape Town. **13th February.**

Additions to Baardscheerders Bosch Primary School (Bredasdorp Division): Secretary, School Board, Bredasdorp; and Black & Fagg, 85, St. George's Street, Cape Town. **13th February.**

CHEMICALS, LABORATORY EQUIPMENT, ETC.

Electrical conditioning oven, supply of, for Onderstepoort Laboratory (tender S.O. 591): Union Tender and Supplies Board, 271 Visagie Street (P.O. Box 371, 'phone 3121), Pretoria. **1st February.**

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

Milk recording equipment, supply of, for Division of Dairying, Pretoria (tender S.O. 598): Particulars as above. **8th February.**

Pyrex flasks and beakers, supply of, for Onderstepoort Laboratory (tender S.O. 601): Particulars as above. **8th February.**

Apparatus and chemicals, supply of, for Biological Control Laboratory, Cape Town (tender S.O. 632): Particulars as above. **22nd February.**

COOKING EQUIPMENT, ETC.

Dough-mixer for Cinderella Prison, Boksburg: supply and delivery (P.W.D. tender 457): P.W.D., Pretoria (Room 531, 'phone 5477). **15th February.**

DRAINAGE AND SANITATION.

Waterborne drainage, installation of, at Girls' Industrial School, Standerton (P.W.D. tender 473): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Johannesburg. **1st February.**

Soil and waste water drainage and sewage disposal works at Housecraft School, Potchefstroom (P.W.D. tender 477): Particulars as above. **8th February.**

Waterborne sewerage on railway premises, Touws River: Chief Civil Engineer, S.A.R. & H., Johannesburg; System Managers at Cape Town and Durban; District Engineer, S.A.R. & H., Beaufort West; and Station Master, Touws River. **26th February.**

ELECTRICAL EQUIPMENT.

Meters, Universal, supply of (P.O. tender 830): District Stores Superintendents, Johannesburg, Cape Town, Port Elizabeth, East London, Durban, Bloemfontein; Divisional Controller, P.O. Pietermaritzburg; Controller of P.O. Stores, Room 77, G.P.O. Annexe, Pretoria. **15th February.**

Transformer, low-tension switchgear and high-tension cable for Reservoir Sub-Station, Voortrekkerhoogte: supply and delivery (P.W.D. tender 455): P.W.D., Pretoria (Room 531, 'phone 5477). **15th February.**

300 k.v.a. transformer for G.P.O., Johannesburg: supply and delivery (P.W.D. tender 459): Particulars as above. **22nd February.**

Electrical conduit fittings for P.W.D.: supply and delivery (tender P.W.D. S.17): Particulars as above. **22nd February.**

Voltmeters, ammeters, millimeters and current transformer, supply of (P.O. tender 835): District Stores Superintendents, Johannesburg, Cape Town, Port Elizabeth, East London, Durban, Bloemfontein; Divisional Controller, P.O., Pietermaritzburg; and Controller of P.O. Stores, Room 77, G.P.O. Annexe, Pretoria. **14th March.**

FURNITURE, FITTINGS, ETC.

Steel cabinets, supply of (Formal Tender 669): Union Tender and Supplies Board, 271 Visagie Street (P.O. Box 371, 'phone 3121), Pretoria. **1st February.**

Steel windows and door frames for Olyvenhoudsdrift Settlement, supply of (tender S.O. 662): Particulars as above. **1st February.**

HOSPITAL AND SURGICAL EQUIPMENT.

Hospital scales for Mental Hospital, Pretoria, supply of (tender S.O. 660): Union Tender and Supplies Board, 271 Visagie Street (P.O. Box 371, 'phone 3121), Pretoria. **14th March.**

ROADS AND ROAD-MAKING EQUIPMENT.

Road graders for Hereford, Vaal-Hartz, Sonop and Kromrivier Settlements (tender S.O. 613): Union Tender and Supplies Board, 271 Visagie Street (P.O. Box 371, 'phone 3121), Pretoria. **15th February.**

Graders for Pilgrims Rest and Nelspruit Districts (tender S.O. 621): Particulars as above. **15th February.**

Bulk bitumen distributors (approximately 3) for Transvaal Provincial Administration (Tvl. Prov. tender 211/1939): Superintendent, Provincial Stores, P.O. Box 857, Pretoria. **28th February.**

Road traffic signs for National Roads in Cape Province (tender F.141/1939): Particulars in Cape Province Official Gazette of 5th January. **2nd February.**

WATER SUPPLY AND IRRIGATION EQUIPMENT.

Pumping plant, tanks and tankstand for Slangkop Receiving Station: supply, delivery and erection (P.W.D. tender 465): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Cape Town. **15th February.**

6-in. power head, 1½ h.p. petrol engine, pump house, tank and tankstand at Bacela Police Post (near Cathcart): supply, delivery and erection (P.W.D. tender 474): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Port Elizabeth. **29th February.**

MISCELLANEOUS.

Soldering equipment, portable, air-acetylene, supply of (P.O. tender 829): District Stores Superintendents, Johannesburg, Cape Town, Port Elizabeth, East London, Durban, Bloemfontein; Divisional Controller, P.O. Pietermaritzburg; Controller of P.O. Stores, Room 77, G.P.O. Annexe, Pretoria. **15th February.**

Trailer, cable hauling, supply of (P.O. tender 831): Particulars as above. **15th February.**

Steel tyres and axles for Railways Administration (tender 2453): Railway Stores at Salt River, Uitenhage, East London, Durban, Bloemfontein, Pretoria; and Chief Stores Superintendent, S.A.R. & H. Headquarters Offices, Johannesburg. **26th February.**

Structural steelwork, etc., for Railways Administration (tender 2524): Particulars as above. **5th February.**

Metal-turning lathe for P.W.D. Workshops, Cape Town: supply and delivery (P.W.D. tender 458): P.W.D., Pretoria (Room 531, 'phone 5477), and District Representative, P.W.D., Cape Town. **15th February.**

Workshop machinery, supply of (P.O. tender 832): District Stores Superintendents, Johannesburg, Cape Town, Port Elizabeth, East London, Durban, Bloemfontein; Divisional Controller, P.O. Pietermaritzburg; Controller of Post Office Stores, Room 77, G.P.O. Annexe, Pretoria. **22nd February.**

Launch for Department of Public Health for Port Natal: supply of (tender S.O. 635): Union Tender and Supplies Board, 271 Visagie Street (P.O. Box 371, 'phone 3121), Pretoria. **22nd February.**

Low-level jetty, etc., at Whitesands, Breede River mouth: Chief Civil Engineer, S.A.R. & H., Johannesburg, and Harbour Engineer, Table Bay Harbour. **5th February.**

Overhead electric travelling cranes for Railways Administration (tender 2496): Railway Stores at Salt River, Uitenhage, East London, Durban, Bloemfontein, Pretoria, and Chief Stores Superintendent, S.A.R. & H., New Park Station Chambers, Johannesburg. **1st April.**

Bar steel for Railways Administration (tender 2541): Particulars as above. **4th April.**

Steel plates for Railways Administration (tender 2542): Particulars as above. **26th March.**

Tenders Accepted

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

AIR-CONDITIONING PLANT.

Air-conditioning plant for Krugersdorp Automatic Telephone Exchange (tender P.W.D. 278): Carrier Engineering (S.A.), Ltd., Johannesburg. £1,556 10s.

BRIDGES AND MATERIALS.

Erection of Amahlongwa River Bridge, Natal: U. Bandini. £6,493 18s. 4d.

Erection of Umtentweni River Bridge, Natal: U. Bandini. £9,525 10s. 2d.

BUILDINGS AND ALTERATIONS, ETC.

Wool Research Laboratory, Grootfontein College of Agriculture (P.W.D. tender 392): T. H. Bisset, Queenstown. £12,450.

Alterations and additions to Trade School, Adelaide (P.W.D. tender 415): Cole & Hannah, Kirkwood. £61,025.

Additional buildings at Leper Institution, Amatikulu (P.W.D. tender 418): E. Thompson & Son, Durban. £4,567 8s. 9d.

Temporary hutment accommodation (65 blocks) at S.S.B. Lines, Voortrekkerhoogte (P.W.D. tender 443): J. C. Bitcon & Co., Ltd., Johannesburg. £16,300.

Temporary hutment accommodation (68 blocks) at Command Training Depôt, Voortrekkerhoogte (P.W.D. tender 434): J. C. Bitcon & Co., Ltd., Johannesburg. £17,076.

Additions to Public Offices, Bellville, C.P. (P.W.D. tender 428): P. W. Kloppers, Robertson. £1,350.

Native Female Ward Blocks at Mental Hospital, Pretoria (tender P.W.D. 429): Grant & Son (Pty.), Ltd., Pretoria. £24,000.

Married Quarters, Waterkloof, Pretoria (tender P.W.D. 425): Hatfield Builders (Pty.), Ltd., Pretoria. £34,489 12s. 9d.

Additions to Empangeni Government School: Armitage & Lagerwall. £1,631.

New Laundry, etc., at Pietermaritzburg Girls' High School: Cross & Gevers. £1,889.

Alterations and additions to Vryheid Girls' Hostel: Steffensen & Duvel. £8,841 17s. 9d.

Additions to Wentworth Government School, Natal: T. Maddox. £1,550.

COOKING EQUIPMENT, ETC.

Double-deck steam tube oven for Cinderella Prison, Boksburg (P.W.D. tender 384): MacAdams, Ltd., Johannesburg. £370, delivered and erected.

(1) **Vegetable peeler,** (2) **food mixer** (tender S.O. 523): Chas. Westwood, Johannesburg. (1) £48 delivered and installed; (2) £70 delivered and installed.

"Durbanian" cooking ranges — 44 (tender S.O. 578): P. Henwood, Son, Soutter & Co., Johannesburg. £1,304 12s., f.o.b. Glasgow.

"Collingwood" cooking ranges — 25 (tender S.O. 578): General Plumbing & Supply Co., Ltd., Johannesburg. £616 11s. 3d., f.o.b. Glasgow.

"Durbanian" range for Queenstown Mental Hospital (P.W.D. tender 391): Buffalo Timber Co. (Pty.), Ltd., East London. £59, f.o.r. in bond, East London.

"Esse" cookers for Queenstown Mental Hospital (P.W.D. tender 391): Buffalo Timber Co. (Pty.), Ltd., East London. £119, f.o.r. in bond, East London.

ELECTRICAL EQUIPMENT.

Steel electric conduit tubing (tender S.O. 524): (1) Reunert & Lenz, Johannesburg; (2) Siemens Bros. & Co. (Br.), Ltd., Johannesburg; (3) Bartle & Co., Ltd., Johannesburg; (4) A.E.G. Eng. Co. (S.A.) (Pty.), Ltd., Johannesburg; (5) McNamara Electrical Co. (Pty.), Ltd., Johannesburg; (6) British General Electric Co., Ltd., Johannesburg (7) Wilson & Herd, Ltd., Johannesburg.

Transformer for Waterkloof Air Station (P.W.D. tender 403): Metropolitan Vickers Electric Export Co., Ltd., Johannesburg. £117, f.o.r., in bond, Durban.

Transformer for Waterkloof Air Station (P.W.D. tender 403): Blane & Co., Ltd., Johannesburg. £67 14s., f.o.r., in bond, Durban.

Cable for Department of Posts and Telegraphs (tender A.L. 234): (1) Blane & Co., Ltd., Johannesburg; (2) Wilson & Herd, Ltd., Johannesburg; (3) Henleys (S.A.) Tel. Works, Ltd., Johannesburg; (4) Stratford Eng., Ltd., Johannesburg; (5) Standard Telephones & Cables, Ltd., Pretoria.

Cable for Department of Posts and Telegraphs (tender A.L. 236): (1) Wilson & Herd, Ltd., Johannesburg; (2) Blane & Co., Ltd., Johannesburg; (3) British Insulated Cables (S.A.), Ltd., Johannesburg; (4) Hubert Davies & Co., Ltd., Johannesburg; (5) Standard Telephones & Cables, Ltd., Pretoria; (6) Henleys (S.A.), Tel. Works, Ltd., Johannesburg.

Table telephones — 3,000 (tender P.O. 811): Rogers-Jenkins & Co. (Pty.), Ltd., Johannesburg. £8,181, f.o.b. British port.

Copper wire (100,000 lb.) for Department of Posts and Telegraphs (tender A.L. 238): British Insulated Cables (S.A.), Ltd., Johannesburg. £2,950, f.ob. Liverpool.

LAUNDRY EQUIPMENT.

Hydro-extractor for Grahamstown Mental Hospital (P.W.D. tender 389): Patlansky Bros. & Schauder, Port Elizabeth. £152, f.o.b. Liverpool.

Ironer (tender S.O. 518): S.A. General Electric Co., Ltd., Pretoria. £25, delivered.

REFRIGERATING PLANT.

Refrigerator for Girls' Training Centre, Pretoria (tender S.O. 518): S.A. General Electric Co., Ltd., Pretoria. £120, delivered.

ROADS AND ROAD-MAKING EQUIPMENT.

Road Scarifier for Karreepoort Settlement (tender S.O. 486): Mitchell, Cotts & Co. (S.A.), Ltd., Johannesburg. £42 10s., f.o.r. Congella.

Hydraulically controlled elevating grader, complete, for Transvaal Provincial Administration (tender 166/1939): Robertson & Moss, Ltd., Johannesburg. £1,386, in bond, f.o.r. Port Elizabeth.

Bitumen emulsion for Transvaal Provincial Administration (tender 182/1939): S.A. Road Supplies, Ltd., Johannesburg: 152,000 gallons at 10¼d.; 43,000 gallons, supplied and applied, at 13⅛d. per gallon, delivered on road.

Miscellaneous materials for use on National and Provincial roads, Cape Province (Cape Prov. tender F.100/1939): Woolf Engineering Co. (Pty.), Ltd., Bloemfontein; Hubert Davies & Co., Ltd., Port Elizabeth; Patlansky Bros. & Schauder, Port Elizabeth; E. W. Tarry & Co., Ltd., Port Elizabeth; African Tool Co. (Pty.), Ltd., Cape Town; Goodyear Tyre Co., Ltd., Johannesburg; Dawson, Dobson & Behr, Ltd., Cape Town; Kirkwood & Sons, Port Elizabeth; Thesen & Co., Ltd., Knysna; George Parkes & Son, Ltd., Knysna; M. J. van Schoor, Ltd., Philadelphia; Anderson Hardware (Pty.), Ltd., Port Elizabeth; Piquetberg & Bredasdorp Lime Works, Ltd., Cape Town; Gourock Ropes & Canvas, Ltd., Cape Town; S.A. Rubber Manufacturing Co., Ltd., Cape Town; Dunlop (S.A.), Ltd., Cape Town; Edward Searle & Co., Ltd., Port Elizabeth; Rogers-Jenkins & Co. (Pty.), Ltd., Cape Town.

Miscellaneous tools for use on National and Provincial Roads, Cape Province (Cape Prov. tender F.101/1939): Woolf Engineering Co., Ltd., Bloemfontein; Anderson Hardware (Pty.), Ltd., Port Elizabeth; Kirkwood & Sons, Port Elizabeth; African Tool Co. (Pty.), Ltd., Cape Town; E. W. Tarry & Co., Ltd., Port Elizabeth; Patlansky Bros. & Schauder, Ltd., Port Enizabeth.

WATER SUPPLY AND IRRIGATION EQUIPMENT.

Reservoir and reticulation at Barracks, Simonstown (P.W.D. tender 419): Murray & Stewart (Pty.), Ltd., Salt River. £6,996.

Pumping plant for Grootfontein College of Agriculture (tender S.O. 511): Malcomess, Ltd., Port Elizabeth. £208, f.o.r. Port Elizabeth.

Cast iron outlet pipes for Department of Irrigation (tender I.D. 222): East Rand Engineering Co., Ltd., Germiston. £220, f.o.r. Germiston.

MISCELLANEOUS.

Grain tanks (tender S.O. 499): Hendler & Hendler (Pty.), Ltd., Johannesburg.

4,000 grain bags (tender S.O. 535): S. Machanick & Co., Cape Town. £225, f.o.r. Woodstock.

Animal gears — 20 (tender S.O. 501): W. J. Bezuidenhout & Son, Rustenburg. £1,200, f.o.r. Rustenburg.

Animal gears — 10 (tender S.O. 501): Vickers Met. Carriage (S.A.), Ltd., Johannesburg. £1,080, f.o.r. Congella.

Animal gears — 20 (tender S.O. 501): Wright, Boag & Co., Ltd., Johannesburg. £1,948, f.o.r. Johannesburg.

Apparatus for electric clock system for New Post Office, Krugersdorp (P.W.D. tender 388): Trevor Williams (Pty.), Ltd., Johannesburg. £79 0s. 6d., in bond.

Vertical cross-tube boiler for Fort Napier Mental Institution (P.W.D. tender 426): A. E. Barker, Johannesburg. £127 10s., f.o.r. duty paid, Johannesburg.

Portable spraying units — 3 (tender S.O. 585): Evelyn Haddon, Ltd., Cape Town. £380.

Caravan for Irrigation Department (tender I.D. 212): J. P. Mathews, Johannesburg. £135, f.o.r. Johannesburg.

Galvanised wire for Department of Posts and Telegraphs (tender A.L. 223): (1) Reid Bros. (S.A.), Ltd., Johannesburg; (2) B. C. Myers, Ltd., Johannesburg; (3) Clyde Trading Co., Ltd., Johannesburg.

Creosote for Department of Agriculture and Forestry (tender S.O. 563): (1) Dundee Coal Co., Ltd., Durban; (2) Steel Sales of Africa (Pty.), Ltd., Johannesburg.

Flake naphthalene for Department of Defence (tender S.O. 176): (1) Patlansky Bros. & Patley, Johannesburg; (2) Woolf Engineering Co. (Pty.), Ltd., Bloemfontein.

Disc harrows (4) for Transvaal Provincial Administration (tender 183/1939): Thos. Barlow & Sons, Ltd., Johannesburg. £117 each, in bond, f.o.r. Durban.

Sheepfoot rollers (5) for Transvaal Provincial Administration (tender 184/1939): Thos. Barlow & Sons., Ltd., Johannesburg. £170 each, f.o.r. Durban.

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