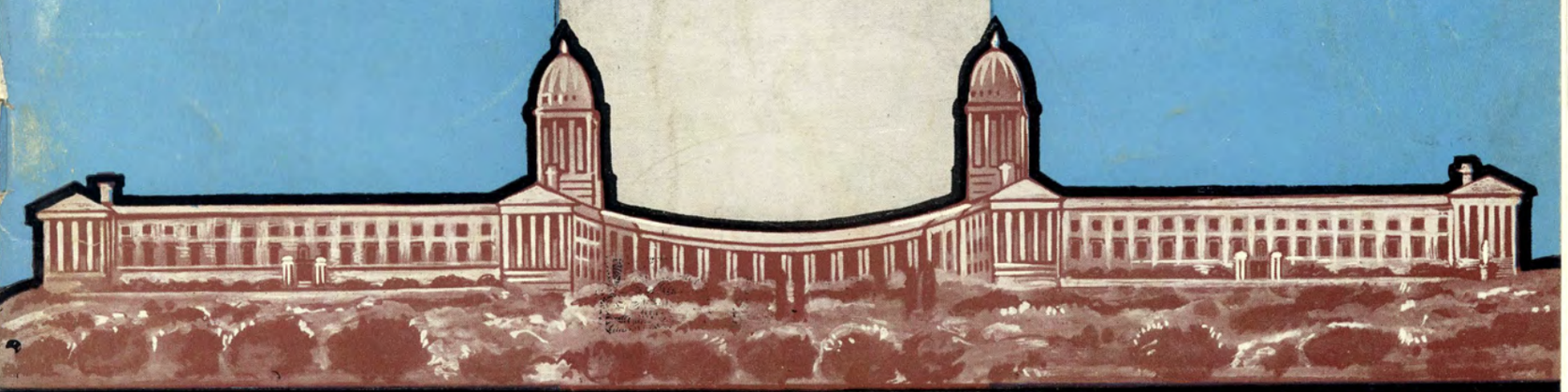
Vol. X. No. 64. MARCH : 1949.

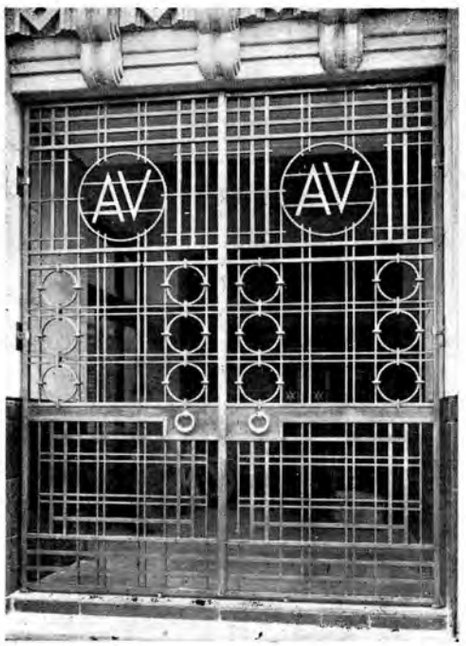
PUBLIC WORKS OF SOUTH AFRICA



Registered at the General Post Office as a Newspaper.

Price per Copy : 1/6

Subscription : 15/- per annum



by SAGE

Bronze entrance gates to Anglovaal House.
Johannesburg.

•

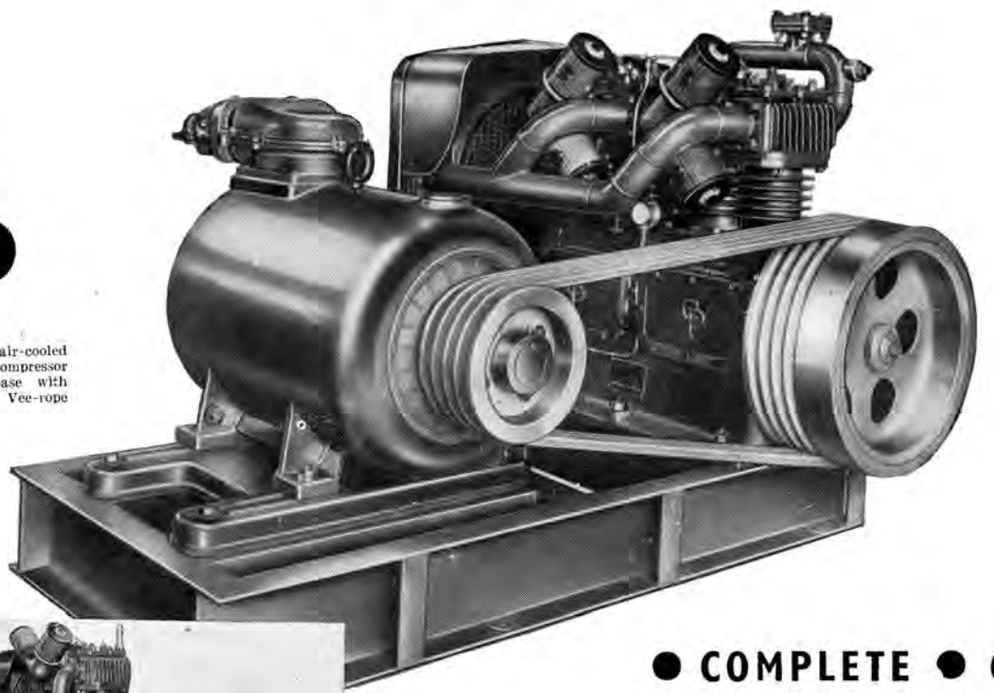
Entrance gates and name panels executed in bronze
for The Standard Bank, Johannesburg.

FREDK. SAGE & CO. (S.A) (PTY.) LTD.

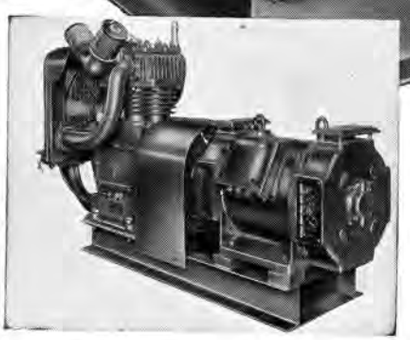
Architectural Metal Craftsmen

P.O. BOX 777. 10, HEIDELBERG ROAD, JOHANNESBURG. PHONE 22-7555.

Compression WITHOUT Complication



CP two-stage, air-cooled stationary air compressor mounted on sub-base with electric motor and Vee-rope transmission.



CP two-stage air-cooled stationary air compressor directly driven through flexible coupling by electric motor.

● COMPLETE ● COMPACT

Apart from the noted constructional features of CP two-stage, air-cooled air compressors, they have distinct advantages in simplicity of installation and continuous trouble-free performance. These units can be supplied with electric motor drive ready for immediate operation and, being air-cooled, do not require complicated systems of water cooling pipes, pumps and tanks.

Phone 34-2351.
P.O. Box 4921.

CONSOLIDATED PNEUMATIC TOOL CO. S.A. (PROP.) LIMITED

1 ROGERS ST.,
SELBY,
JOHANNESBURG

AGENTS:

R. L. Weir & Co. (P.E.), (Pty.), Ltd., P.O. Box 148, Port Elizabeth.

Rogers-Jenkins & Co. (Pty.), Ltd., P.O. Box 1425, **Cape Town.**

Engineering Supply Co., 10–12 Oxford St., East London.

J. Clack & Co., Ltd., P.O. Box 638, Bulawayo.

J. Clack & Co., Ltd., P.O. Box 409, Salisbury.

J. Clack & Co., Ltd., P.O. Box 25, Ndola.

Adriana Maia (Suc. & Ca. Lda., P.O. Box 354, Lourenco Marques).

PUBLIC WORKS OF SOUTH AFRICA

PROPRIETORS: PUBLIC SERVICES PUBLICITY (PROPRIETARY) LIMITED, EDITORIAL OFFICES AND PUBLICITY DEPARTMENT: FIRST FLOOR, 92, MAIN STREET, JOHANNESBURG TELEPHONES 33-9606, 33-1505. LONDON ADDRESS: RYTON PUBLICITY SERVICES, 92, FLEET STREET, LONDON E.C.4.

EDITOR:
W. R. GORDON, O.B.E. M.I.I.A. M. Inst. F.

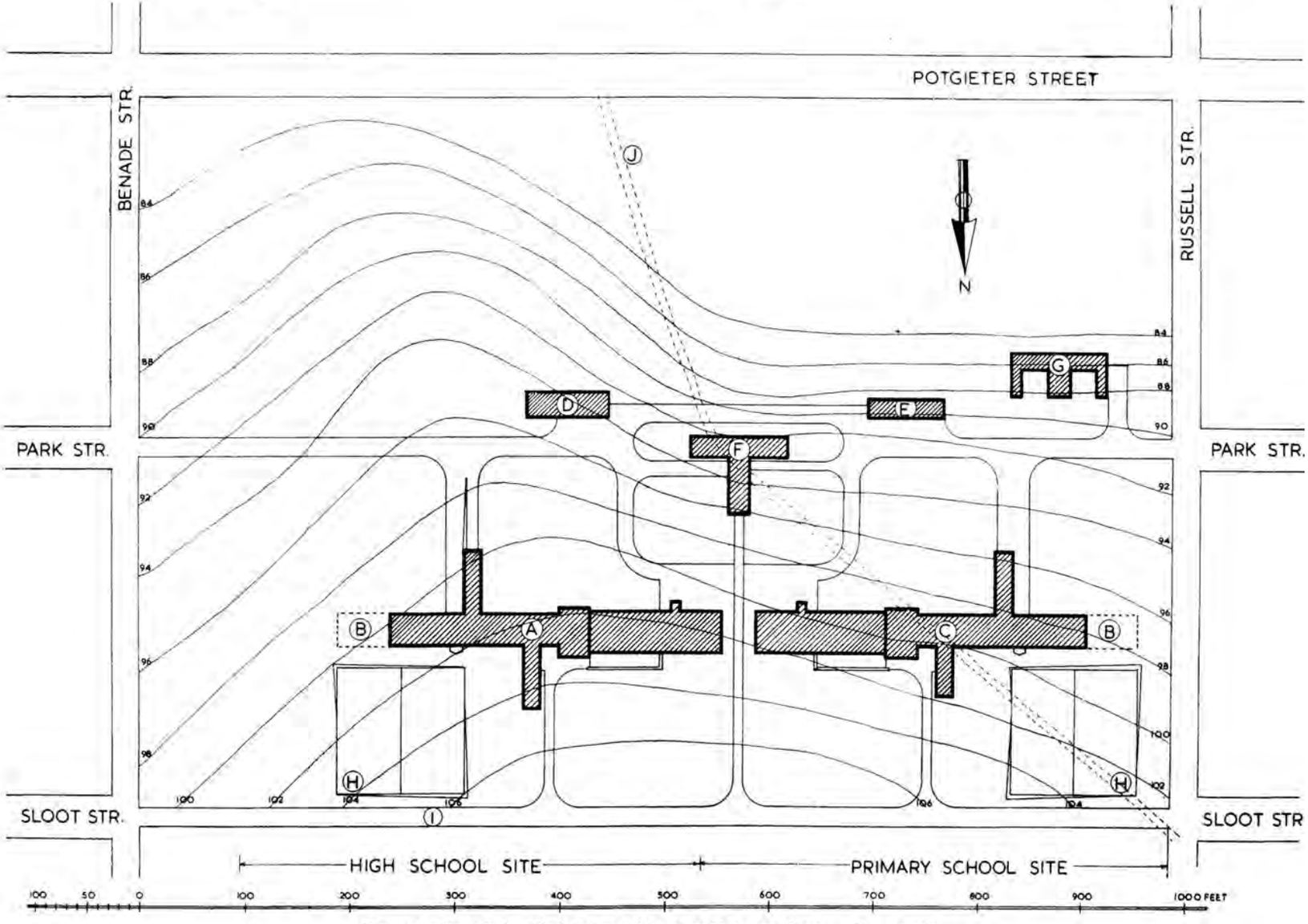
PUBLIC WORKS OF SOUTH AFRICA, which is published monthly, is intended to keep the public up-to-date in regard to the engineering and building projects of the Central Government, the Provincial and Municipal Governments of Southern Africa and activities overseas.

VOLUME X • NUMBER SIXTY-FOUR • MARCH 1949

CONTENTS

LEGEND

A Boys' Hostel
B Future Extension
C Girls' Hostel
D Laundry
E Garages
F Domestic Staff and Hospital
G Native Quarters
H Tennis Courts
I Approach Avenue
J Furrow



General Plan of the High School Hostel at Zeerust, Western Transvaal.

HIGH SCHOOL HOSTEL AT ZEERUST

To accommodate pupils living on scattered farms and too far away to make the daily journey to and from school, the Transvaal Provincial Education Department has erected a high school hostel at Zeerust. At present the buildings can house 80 boys and 80 girls. Future extensions allow for another 40 children of each sex, making 240 boys and girls together when the hostel is finally completed. This article describes and illustrates the building.

THE site is an open one with a few indigenous trees dotted here and there and these have been left in situ as far as possible. The site was chosen as being most suitable and right opposite the School. On the south side of the site the playgrounds and sportsfields have been laid out and made very successfully by the school personnel.

Ground

The ground consisted of hard shale and soft rock. A stormwater furrow ran across the site and was filled up. The domestic staff quarters and hospital, however, were partly built over this furrow and their foundations are down to 14 feet in depth.

The slope of the ground was used to place the cycle sheds below the ablution blocks of both Hostel buildings.

General Features

The Hostel comprises two dormitory buildings for boys and girls, respectively, with dining rooms and kitchens; domestic staff quarters and hospital buildings, a garage building, a laundry building and separate Native quarters.

The layout of the buildings is symmetrical on the axis north-south, with the dormitory buildings in front running east-west, and the domestic staff quarters and hospital at the south end of the axis. The other buildings are to the east and west of the axis, balanced and behind the dormitory buildings.

The main approach is on the north through an elliptical arch built in dark blue brick, with the dormitory buildings on each side in light facing brick and domestic staff building and hospital in front, making a finish to the main approach. Subsidiary entrances lead to dormitory and other buildings.

In planning the buildings a slight departure was made in respect of kitchen and services, as they are in this instance separated and attached to each dormitory block, thus forming two complete separate units, one for boys and one for girls.

North aspect of girls' dormitory block showing staff wing projecting.

Porch and Verandah to Staff Rooms.

The Dormitories

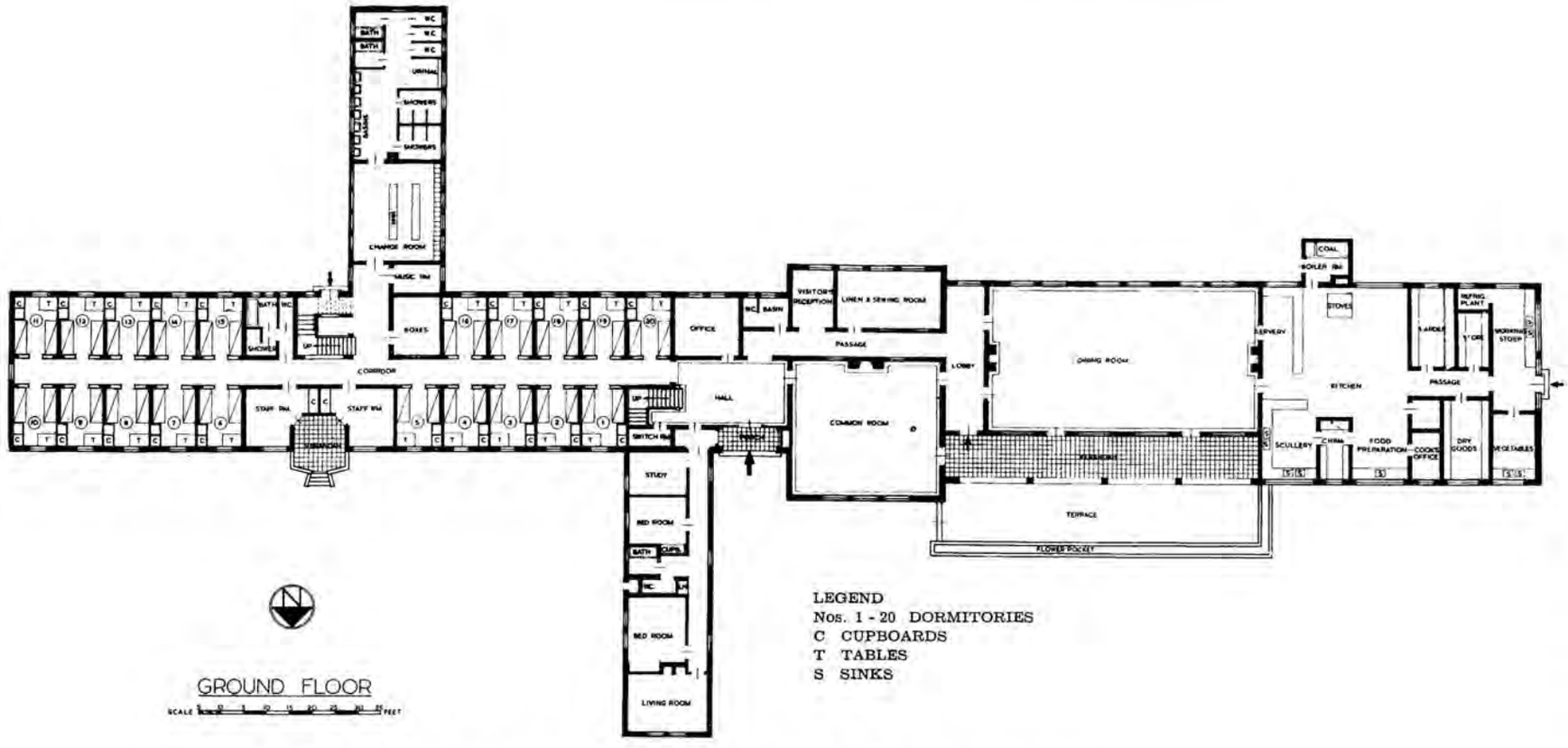
The dormitory buildings, for both boys and girls, are planned on two floors, but with the dining room, kitchen, etc., on the ground floor, and with slight detail variation in the ablution blocks. They also have attached to them, on the north side, quarters for staff in single storey buildings.

The overall length of the dormitory building, with dining room and kitchen, is 318 feet. The main entrance to each building is on the north side through a spacious hall, where a general office is situated and from where a good control can be exercised over the various rooms of the building and the main stairs leading to the first floor. This is in addition to the external control obtained by entrances on the north side from the Staff Quarters.

On entering the hall by easy access we have the Common Room, and in proximity to the Office the visitor's reception room, linen and sewing room. A lobby, which also acts as a separate entrance from the verandah on the north, leads through two separate doors into a spacious dining room 56 feet long, with fireplaces on both end walls. This room is well lit by large windows and glazed doors opening on to the verandah.

Kitchen and Diningroom

Food is served directly into the dining room through in-and-out doors from the servery with counters. There is a large, well-lighted and properly fitted kitchen, with scullery, china cupboards, sinks, food preparation table and stove. Hotwater is provided from the boiler next to the kitchen on the south side. From the kitchen, through a passage, entry is made to the larder, store, dry goods and linen cupboards, also the



Elevation and plan of dormitory block, Zeerust High School Hostel.

Preparation end of kitchen; cooking is by anthracite-burning heat insulated stoves.

vegetable store and working space, all under the control from cook's office. A refrigerating plant keeps all the food stored in good condition. The tradesmen's entrance for supply of foodstuffs is at this end of the building and is approached by the road through the central entrance. On the opposite side of the road is the tradesmen's entrance to the other Hostel building.

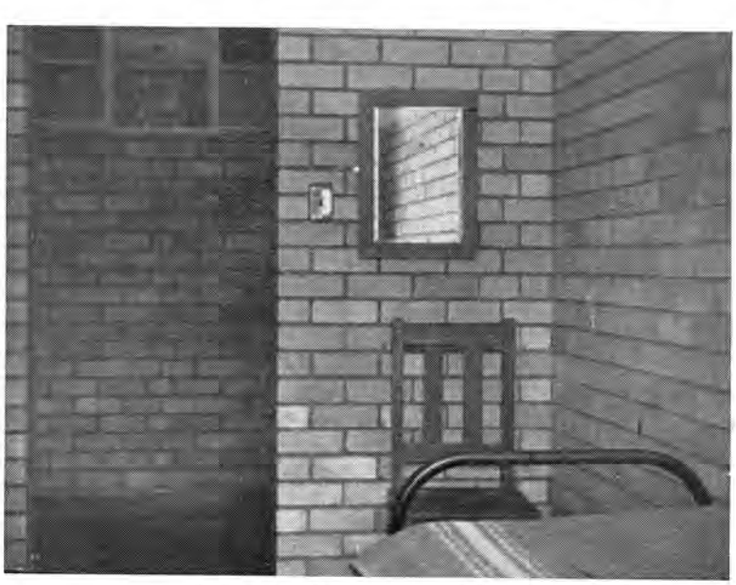
Pupils' and Staff Sleeping Quarters

From the entrance hall, in the opposite direction to the dining room are dormitories placed on each side of the main corridor, with low dividing walls without doors. Each of the dormitories are constructed for two pupils and fitted with built-in cupboards. There are 20 rooms for 40 pupils on the ground floor. Halfway along the south side of the corridor is the lobby with secondary stairs leading to the first floor. Opposite the stairs is the room for storing pupils' boxes and a small music room. This lobby is the only entry into the ablution block which is thus under constant vigilance from the staff room. The change room is fitted with 40 lockers and space for future lockers, when the extensions to the dormitories have been added. From the change rooms, through a door, are the lavatories with wash basins, W.C.'s, baths and showers in the case of the boys. These are well-lit and cross ventilated.

Next to the main entrance is a single storey wing projecting to the north with two self-contained flats for staff comprising, in one case, a living room and bedroom and in the other, a bedroom and study with bathroom, etc.

The first floor of the dormitory wing, approached by stairs from the ground floor, is identical with the ground floor but with slight variations in detail. There is a staff sitting room next to the Common Room and over the linen and sewing room and passage on ground floor. Also there is a visitors' bedroom and bath, over the visitors' reception room, together with a writing room over the office. This floor also provides accommodation for 40 pupils.

Study, for evening preparation, in the girls' block.



Corner of doorless cubicle for two pupils.

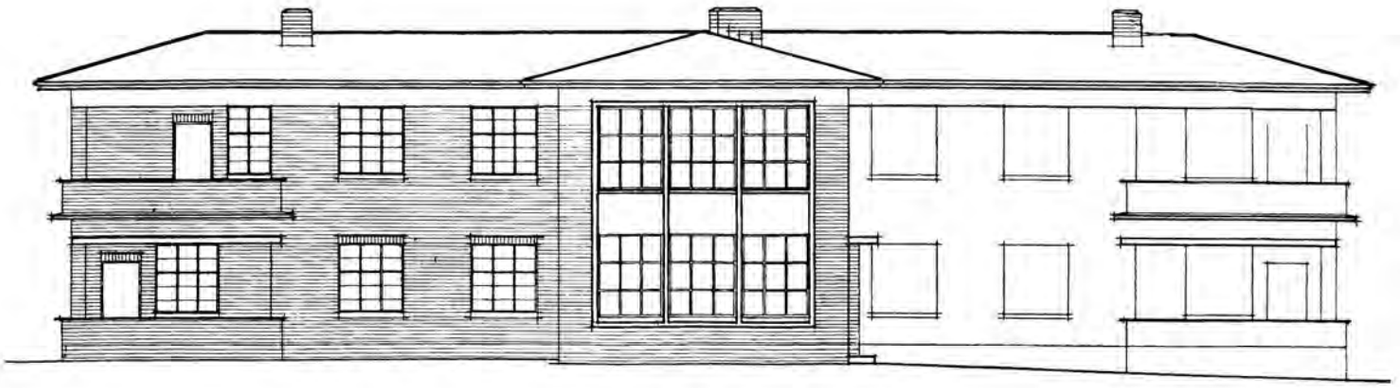
Domestic Staff Quarters and Hospital

These are situated on the main axis behind the hostel buildings and are of T-shape plan. They consist of two floors, a ground floor for boys and first floor for girls. In the top stroke of the T are the quarters for the Matron and Assistant Matron, bedrooms for the cooks and maids and a sitting room, all connected by an internal passage on the north side. In the leg of the T are the Sick Bays, with an open verandah, full length of the sick bay, for the beds of convalescents. The rest of the wing contains bathrooms, sluice rooms, linen rooms, etc., all in connection with the sick bay.

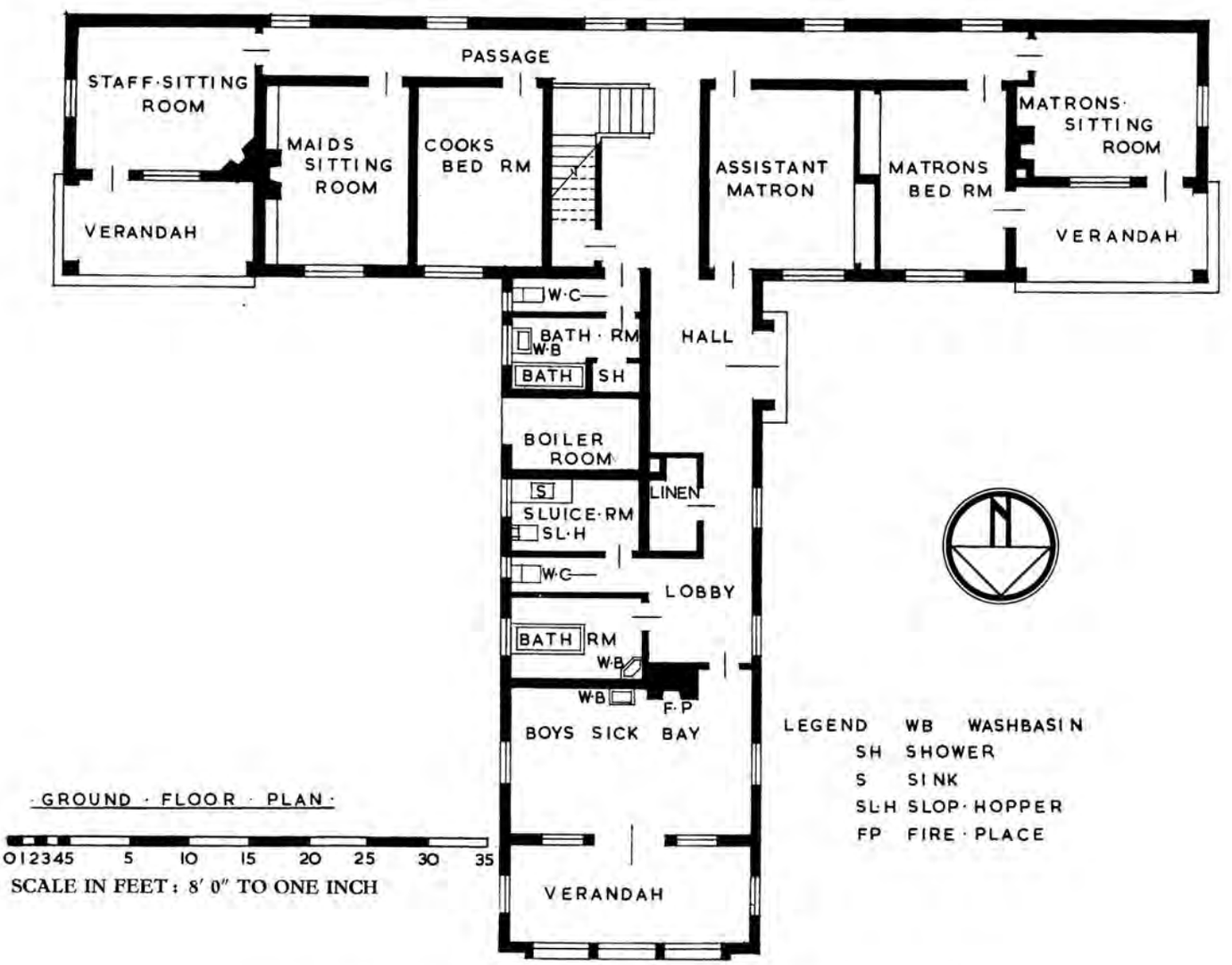
Native quarters and store are housed in a single storey building which contains separate quarters for men and women, round their own internal yards, screened by walls.

Laundry and garages complete the Hostel unit.

(Concluded on page 21)



NORTH · ELEVATION



Matron's and Domestic Staff Quarters and Sick Rooms, Zeerust High School Hostel.

Materials Employed

Construction of all the buildings is similar and consists of continuous concrete foundation, brick walls, reinforced concrete floors, rhino-board ceilings and wood roof trusses, covered with corrugated iron sheets. The outside of the buildings is faced with light facing brick, with a darker brick for base and with plaster surrounds to special features on the elevation. Inside, the finish to walls and ceilings is plaster, while the floor is finished with wood blocks. Steel windows and wood doors are employed throughout.

Generally, the outside elevations and grouping of buildings give a pleasing effect.

Owing to lack and scarcity of materials, labour, transport, etc., during the recent war period, no tenders were received and the work was consequently carried out departmentally at a cost of £72,000.

External details of the piping from the lavatories, baths and wash-basins in the girls' block, south wing.

POWER WITHOUT PROFIT

The recent celebration of the twenty-fifth anniversary of the foundation of the Electricity Supply Commission, and its absorption of the Victoria Falls Power Company's interests in the Union, enables a survey to be made of the progress of Escom over the past quarter of a century.

WITH the acquisition of the V.F.P. assets, Escom now has a loan capital of £45,250,000 and a total installed capacity in its power stations of 1,343,190 kW. Broadly speaking, the Commission's main areas of supply are four in number, namely the south-western Transvaal and northern Orange Free State; Natal; the Border country between Cape Province and Natal; as well as the Cape Peninsula and immediate vicinity. There is also an isolated station at Sabie. The map overleaf indicates these supply areas and the 18 power stations serving them.

Other Plants

There were, in addition, over 400 electricity generating plants, large and small, serving different parts of the Union in 1945-46, the latest year for which complete statistics are available. The capacity of plants varied considerably from those installed to supply a single industrial undertaking, such as a flour mill, to those meeting a growing municipal demand. That the bulk of these plants were extremely small is revealed by the fact that 284, out of the 436 power stations operating in 1945-46, had an installed capacity below 5,000 kW. There were 31 plants of 5,000 to 50,000 kW and no more than 14, altogether, with a capacity in excess of this latter figure.

Apart from municipal and industrial undertakings the South African Railways have, in some areas, due to lack of alternative sources of supply, installed power plants of their own. Some of these furnish electricity to adjacent towns. But it is clear from these facts, that Escom is by far the largest supplier of electricity in the Union, being responsible for some 6⅓ per cent. of the installed capacity.

While oil, in one form or another, is used for a high proportion of the prime movers installed in the smallest plants, steam turbines and reciprocating engines, using coal-fired boilers, are responsible for by far the bulk of the Union's electric output. In 1945-46 well over 90 per cent. of the power generated was derived from 230 steam turbines. Due to lack of large rivers or lakes the supply from hydro-electric sources was extremely small by comparison. Of Escom's 18 stations, only one, at Sabie, was operated by water turbines. Its 1946 output, for mining purposes, was 7.85 million units.

Rising Consumption

The growth of consumption of electricity in South Africa is well shown by the development of the Escom undertakings. Whereas, in 1925, the installed generating capacity was only 400 kW and the units sold were 80,000, by 1st July, 1948, the generating capacity had risen to 1,343,190 kW, producing 5,520 million units annually. The chart on page 25 indicates the growth from 1925-47.

Escom Undertakings

In the south-eastern Transvaal and northern Free State area of supply, the seven Escom stations are Witbank, Klip, Vaal River, Brakpan, Simmer Pan, Rosherville and Vereeniging. The first of these serves the adjacent coalfield, all of

whose collieries, practically without exception, take their power from it in preference to generating their own. The projected station at Vierfontein will supply the new O.F.S. goldfields.

In 1947, the Witbank station, using 20 Babcock and Wilcox boilers and 5 Parsons turbo-generators, sent out a total of 756.9 million units. The coal consumed was close on 700,000 tons and the overall thermal efficiency reached 17.02 per cent. At the Klip station, in the same year, 24 B & W boilers with twelve 33,000 kW turbo-alternators and four house sets distributed 547.2 million units. Coal consumption exceeded 2,300,000 tons while the overall thermal efficiency reached 20.64 per cent.

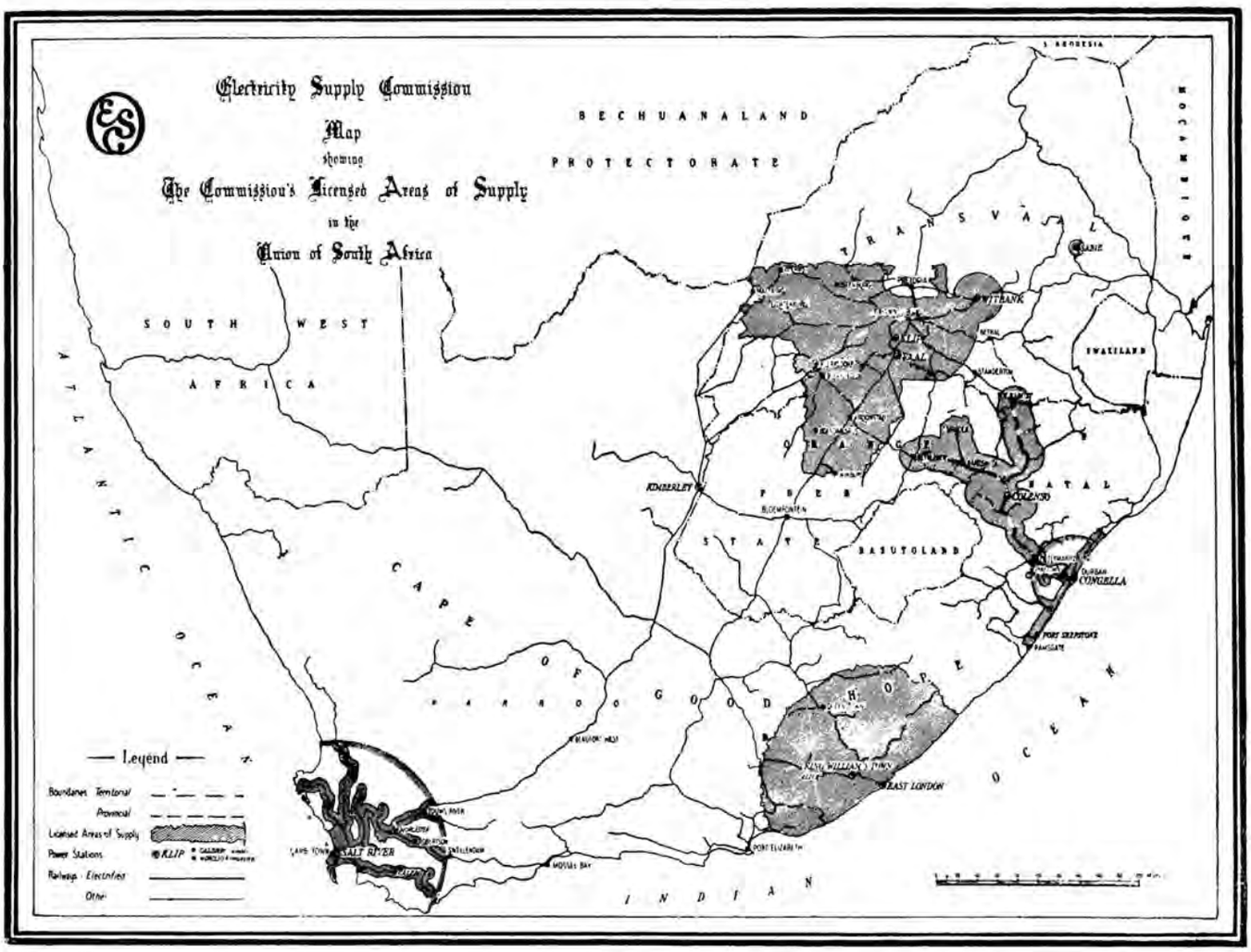
The Vaal undertaking is in process of expansion. Even so, the six B & W boilers, fitted with chain grate stokers and the five 33,000 kW M.V. and A.S.E.A. turbo-generators, sent out 668.6 million units in 1947. The overall thermal efficiency, at 22.37 per cent., was the highest of all the Escom undertakings. Coal consumption was nearly 475,000 tons.

The Natal group comprise Colenso, Volksrust (a stand-by station), Congella and Port Shepstone. At Colenso, where a second station is in course of construction, 1947 sales reached 366.4 million units, with an overall efficiency of 17.9 per cent. The Congella output was some 11 million units higher and its thermal efficiency 1.3 per cent. greater than Colenso. At Port Shepstone the two English Electric 700 kW diesel engines have been supplemented by two General Motors 1,000 kW generators.

In the Border area the East London, Kingwilliamstown and Alice power stations are recent acquisitions, within the last couple of years. At the Cape, apart from the main station at Salt River, there is a minor plant at Caledon and a new major station projected at Worcester, with the main object of supplying power for electric traction. In the last centre a General Motors plant has recently been installed, pending the erection of a permanent plant, which will, eventually, have five 20,000 kW steam and two 1,000 kW diesel generators. In 1946 the Salt River plant generated 161.68 million units with an overall thermal efficiency of 16.91 per cent.

Consumption by Types of Consumer

So far as the use of electricity in the Union is concerned, industry consumed, in 1943-44, 1,365 million units and was increasing its consumption at the rate of 14.5 per cent. annually. By far the largest provincial user of electricity for



The Klip station interior, showing the twelve 33,000 kW turbo-alternators in operation.

industrial purposes was the Transvaal, where 871 million units were consumed in the same year and where the annual rate of increase, at 16.4 per cent., was nearly 2 per cent. above the average for the whole country. Natal and the Cape, at 240 and 224 million units annually respectively, were almost equal in consumption but the industrial rate of increase in Natal was 13.7 per cent. as compared with only 105 per cent. in the Cape. As might be expected O.F.S. industrial consumption, at only 30 million units, was then by far the lowest of the four provinces.

Mining, in 1943-44 required the use of nearly three times as much electricity as industry, the consumption exceeding 3,700 million units for the whole Union. Incidentally, the average progress per annum for electricity for mining, at 11.75 per cent., was almost exactly the same as for the whole Union for all purposes.

Domestic use accounted for a total of 1,352 million units, slightly less than industry. The Transvaal, with the biggest European population, again topped the list with 678 million, with the Cape and Natal following with 423 and 213 million units, respectively. The O.F.S. domestic consumption was only 38 million, exceeding that of local industry by some 8 million units. As Mr. W. H. Milton, now Chief Commercial Engineer to the Commission, pointed out in his Presidential Address to the S.A. Institute of Electrical Engineers in 1947, while "rural and farm supplies have been developed rather extensively in the Cape and Natal . . . electricity is not used extensively for farming processes and privately-owned plants are principally house lighting sets."

Railway traction consumed 489 million units throughout the Union. This represented rather more than seven per cent. of the 6,920 million units sold during 1943-44. Incidentally, the coal burnt, to produce this volume of power for all purposes, amounted to 6,921,000 tons. In other words, 1 ton of coal was consumed for every 1,000 electrical units distributed. The cost of the fuel used was close on £3,000,000.

Future Prospects

The organisation, to whose leadership Mr. A. M. Jacobs, formerly the Chief Engineer, has succeeded the late Dr. Hendrik van der Bijl, is still expanding. Thanks to the

(Concluded on page 25)

The Vaal River Power Station to which extensions are being made.

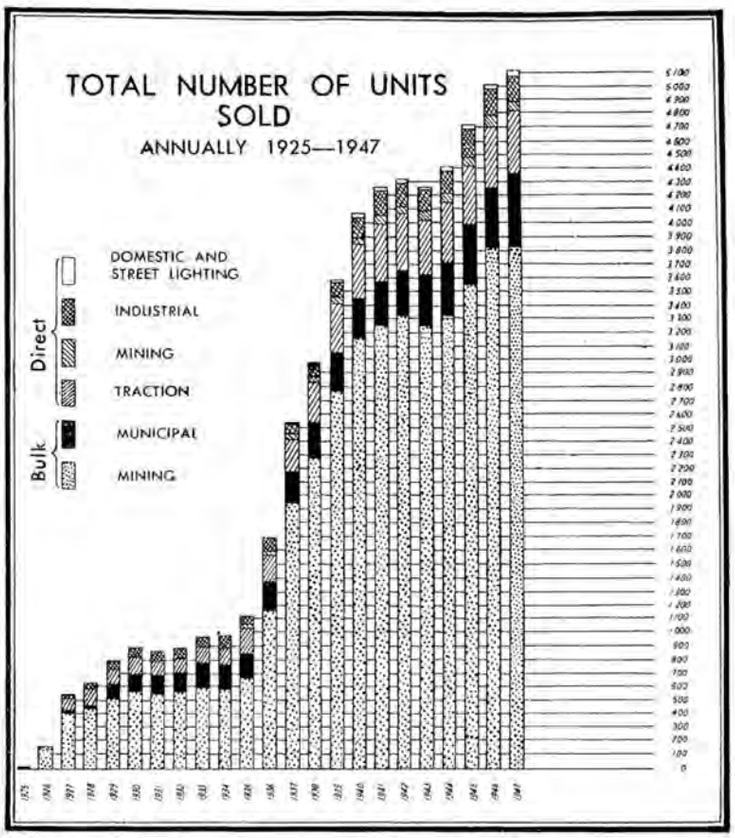
The Colenso power station, the main Natal installation, where a second station is now under construction.

Electricity Amendment Act of 1947, the Commission can now, subject to the agreement of the Minister of Economic Development and of the Electricity Control Board, undertake development in areas not capable of being immediately remunerative: any deficit arsing from approved extensions of this character would be advanced by Parliament and, later, repaid by the Commission, once the project began to pay its way.

New stations are planned at the Cape (Worcester), at Pinetown in Natal and at Vierfontein in the northern Free State. Shortly, it is expected, the Commission will take over and operate the Kimberley power station, presently belonging to the De Beers Consolidated Mines, Ltd. A new plant, estimated to cost £8 million, is planned alongside the existing power station at Cape Town. Also, as already mentioned, both the Vaal River and Colenso installations are being enlarged.

To some extent this expansion is a back-log created by the second World War and much of the work has been delayed further by difficulties over delivery of plant. But, in spite of these setbacks, the electrification of the Union proceeds apace.

As Mr. Milton, in his paper, said: "The water supply position is likely to establish the ultimate limit of annual productivity . . . There is an ample supply of coal for our future needs . . . Government plans for the development of industry and populations over a widespread area must be carefully prepared with due regard to all the factors involved, with no undue emphasis on electricity supply . . . Electrification of sections of the Railway system should assist the Government in developing their plans . . ."



The graph shows the great increase in sales of electricity, especialy since 1936.

HOUSING STANDARDS

Extracts from Part II of a Symposium presented to the South African Health Congress, on behalf of the National Housing and Planning Commission.

By

P. H. CONNELL, B.Arch., A.R.I.B.A., M.I.A.,

Head, Architectural Division, National Building Research Insti tute, Council for Scientific and Industrial Research.

THIS paper reveals some of the work carried out during the past eighteen months by the Research Committee on Minimum Standards of Accommodation, under the auspices of the Council for Scientific and Industrial Research. As the author points out the housing shortage in South Africa has reached the proportions of a crisis. Not only war shortages but radical changes in the national life of the people have contributed to cause this crisis.

In dealing with the 300,000 dwelling units required over a period of years, certain minimum standards of planning, construction, comfort, services and amenities will be needed. At the same time standards of architectural design must be well above minimum, otherwise the effect on the national morale will be depressingly bad. As the author emphasises, good design costs no more than the price of seeking out the country's best designers.

THIS paper deals with the question of the standards to be adopted in future housing policy in this country, with special reference to the minimum standards.

In housing, which affects intimately the living conditions of the people and which may even be said to shape the very

pattern of their daily life, it is of vital importance to keep in touch with the realities of the social situation. It is hopeless to try to lay down standards without a careful study of the trends observable in society, and of the needs and aspirations of the people themselves.

Our society, a more than usually complex one, is characterised at present by a powerful series of changes in the traditional way of life. Economically, the change is expressed in the shift from a predominantly agricultural to a predominantly industrial organization, this process being accompanied by a drop in the productivity of the soil and the very real danger of a desert-encroachment on hitherto occupied land; thus the direction of the change is likely to be sustained. Socially, the change is accompanied by a drift to the towns, by black and white populations alike. This condition, too, is likely to continue for some time. This basic change involves, for those who experience it, a profound change of occupation and environment, and in the case of the Bantu this assumes the proportion of an industrial revolution involving very far-reaching social and economic changes.

The Housing Crisis

These changes have resulted in the gradual emergence of a chronic housing shortage, concentrated in the urban areas and affecting all classes of the population. Reinforced by the cessation of building activity during the war, this shortage has assumed the proportions of a crisis, the effective solution of which is to-day one of the country's major social problems. And it must not be forgotten that by far the greatest proportion of this critical housing shortage lies within the field of native housing.

Faced with need to construct large numbers of dwellings, it becomes essential to examine closely the requirements to be met, in order to avoid costly and even dangerous mistakes. The effects of the great change reveal a clear trend towards the rapid adoption of the normal patterns of European urban life on the part of the newcomers of all races. Stated in simple terms, this involves a change for the rural Bantu from a tribal and communal society to a state of affairs in which the family becomes the basic social unit — as it is among urban Europeans. This has had a profound effect on habits of life, on family relationships and on habits of thought and feeling. This means that western standards of health, hygiene, morality and amenity must be fostered and preserved, and that the design and planning of dwellings must protect such standards.

A house, pre-fabricated in Britain, about to be erected on a site.

In the light of this it becomes necessary to look ahead and try to assess the kind of housing which will be considered acceptable by the next generation — for on the present basis on which housing loans are provided, dwellings constructed now will still be in use when occupied by the next generation, fifty years ahead. Hence the great danger of premature obsolescence will be readily appreciated.

In working out minimum standards for housing, then, this fundamental social trend should be regarded as the starting point, for there can be no advantage in spending large sums of money on a housing asset, considered acceptable to-day, which may become, *through unsuitability*, a crushing liability within a comparatively short time.

More Facts Wanted

A great deal of study and information on other social aspects relating to housing is needed to reinforce our present knowledge of the subject and enable us to design housing of a good standard; there are the opinions and aspirations of the householder himself (or should one say "herself"?); there is a need to study the vital statistics in order to gain an insight into such things as the changes in the structure of the population and of the family, changes in economic status, the pattern of family and social life. Then there are such problems as the revision and modernization of the legislation governing housing standards. Information on many of these subjects is scanty, yet it is badly needed by the housing designer, who at present works mainly in the dark, with only his own limited experience and his knowledge of the situation as it exists at present to guide him. Wide fields of research lie open in each of the subjects mentioned; a good deal of it must, of necessity, start from scratch, as in many cases the vital statistics which should form the basis of study do not exist. Consequently it will be necessary to show without delay what statistical information is likely to be required by the housing designer of the future, in order that steps may be taken now to collect the necessary rentals.

To work out valid minimum standards for housing having a life of fifty years would be a difficult task even in normal times, in view of the scanty information available on these vital issues. It is made even more difficult at the present moment by the high cost of building which is tending to force standards downwards. The extent to which this downward trend may be permitted must be weighed against the very real dangers of premature obsolescence, which may have serious social repercussions.

This paper outlines the manner in which an attempt is being made in the Union to lay down minimum housing standards, technically sound and having a measure of social validity. These minimum standards cover the requirements of health, morality and amenity necessary for the preservation of family life and the promotion of a more stable condition in society. It will be suggested that by the temporary relaxation of certain conventional standards, the cost of housing may be reduced without prejudice to the more important human and social values.

In the application of minimum standards for housing design, the following general principles should be adhered to:

(a) That there are certain basic minima, which safeguard the health and well-being of the occupants, which must

be insisted upon in all cases. In these are included the minimum standards of space necessary for the functioning of family life under healthy and decent conditions, together with certain minimum services necessary to the same ends. Within these standards, certain comfort standards calculated to maintain health and efficiency may also be included. Reductions in cost should never be made to the prejudice of these basic standards.

(b) Reductions in cost, which may be necessary for economic reasons, may be made by means of reductions in the standards of construction or by the temporary postponement of those requirements which can be delayed for a time. Such reductions in standards need not necessarily result in a poor housing environment, provided that the architectural standard remains high. Every effort should be made, therefore, to secure competent professional advice on the matter of architectural and town planning standards, as the cost of such advice is negligible in comparison with its advantages.

Minimum and Desirable Standards

In dealing with housing standards there are at least two aspects to be considered, namely, the necessity to define a minimum standard, and the function of what may be termed "desirable standards." There is an essential difference between the two.

(a) *Minimum Standards.* In practice the chief function of the minimum standard is to form a rigid barrier, defining clearly the minimum permissible levels of residential accommodation. Minimum standards are designed to prevent the creation of slums, to discourage housing maladjustments such as overcrowding, invasion of the family due to enforced sharing of dwellings, etc., to preserve essential personal privacy, to ensure a measure of personal and household cleanliness, to promote civilized standards of hygiene generally, and finally, to overcome some of the disadvantages hitherto present in obsolete, unplanned communities. Such standards can be reasonably easily assessed and can, moreover, be made mandatory.

(b) *Desirable Standards.* The function of "desirable" standards is complementary to that of minimum standards. Desirable standards of housing are a matter of influence rather than of mandatory action, but it is important, nevertheless, not to belittle the importance of the existence of a body of opinion which throws light on the desirable "target" for mass housing and which establishes an ideal against which achievements may be measured.

Minimum Standards

An important study on minimum housing standards has been undertaken during the past eighteen months by a series of sub-committees, of a special research committee working under the auspices of the Council for Scientific and Industrial Research. This committee, known as the Research Committee on Minimum Standards of Accommodation, has been studying the problem with reference to standards of design, planning and comfort, and has also taken into consideration the needs of the housewife, the social trends to be taken into account and the problem of the complex legislation at present

Half a house, completed in the factory, being loaded for delivery to the site.

governing the application of minimum standards. The reports covering these various studies are about to be handed to the National Housing and Planning Commission for its consideration.

Basically the objects of this work were to provide a sound working basis for minimum housing standards, to reveal the gaps in present knowledge where further research may be necessary, to seek to unify conceptions on the issue, and to simplify, if possible, the forms of adminstration and legislation in respect of minimum standards.

Minimum standards, applied to housing, may conveniently be considered under five heads :—

(1) Standards of space and planning : which include basic space requirements, planning standards (related to convenience) : storage equipment, etc.

(2) Standards of Services : sanitation, water and heat services, service equipment : roads, sewers, mains, street lighting, storm water drains, etc.

(3) Structural standards, which control such factors as strength, durability, weather resistance and finish.

(4) Comfort standards : including provision for heating, cooling, ventilation, lighting and noise reduction.

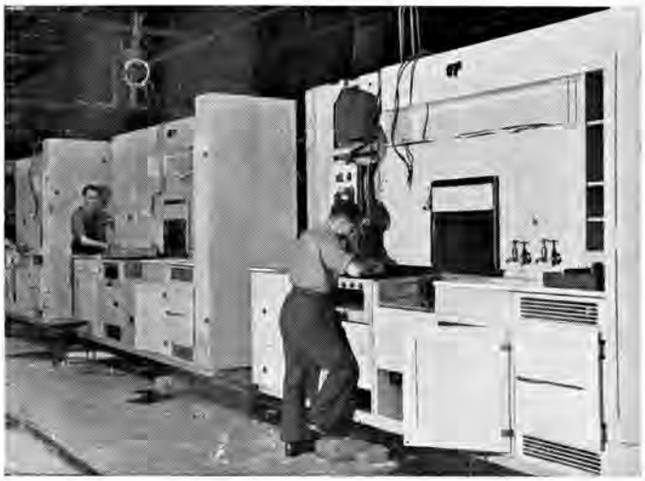
(5) Architectural standards : largely qualitative, which cover such factors as aesthetic qualities, visual relationships, character (appropriateness) and scale.

In practice all minimum standards are a compromise between the ideal and what is practically possible. There are some standards, however, in respect of which no compromise should be permitted — standards which may be termed basic to the community's continued welfare. These are :—

(a) Standards which safeguard the integrity of the family, and hence tend towards the establishment of a basically stable society.

(b) Standards which safeguard the health of the community.

To these may possibly be added minimum standards of housing-estate planning, designed to prevent the emergence of anti-social tendencies in the community.



Accessories such as refrigerators, ovens, bathrooms, are all fitted on the assembly line to these all-electric pre-fabricated houses.

Standards of Space and Planning

The first consideration is the fundamental demand for shelter. In this respect the minimum standard which should be aimed at is that every independent family unit should have its own dwelling. Such a dwelling may, of course, take the form of a house or a flat (with or without certain communal facilities), a self-contained suite in a hotel or boarding house, or even, since we must remember to include the Native in our study of the problem, a group of huts in a kraal. The important things is that there should be enough dwelling units to go round, so as to avoid the continuance of the present state of affairs in which large numbers of families have insufficient accommodation, either living in rooms or being forced to share their dwellings with others. The sharing of dwellings, which implies an invasion of the family, should not have to be resorted to unless the family concerned desires it.

Family Living Space

The subdivision of living space in family dwellings should provide the following conditions **at least** :—

(a) Space for sleeping.
(b) Living space other than space for sleeping and used for common family activities such as eating, entertaining, etc.
(c) Provision for personal privacy.
(d) Essential storage space.

Existing legislation provides for the separation of the sexes in sleeping rooms, but makes no specific provision for living space additional to bedrooms. In practice the result is that cases are often encountered in which the living room is tacitly expected to do double duty as a sleeping room. No great harm would come of this if it were used as a bed-sitting room, occupied at night by the parents (as is often the case in Continental practice), but evidence recently placed before the Research Committee on Minimum Standards of Accommodation indicated that it is almost always the children, usually boys, who sleep there. In this way their sleep is disturbed almost every night, to the detriment of their general health. To avoid this state of affairs, it is considered that future minimum space standards should define the sleeping rooms, as at present, but that in addition a certain minimum of living space additional to bedrooms and intended for use as a family living room, should be laid down.

The subdivision of the total living space into sleeping and living rooms provides for the need for personal privacy. In addition, such functions as washing and elimination should take place in conditions of privacy. It should be laid down that rooms be provided to contain these functions. In designing new dwellings it is essential to guard against premature obsolescence ; therefore, in all dwellings, the space provided for ablution purposes should be big enough to contain a conventional bath, even though no bath may be installed initially.

Storage Space

A certain minimum of storage space may be considered as basically essential in any dwelling in particular storage for food. Not only should the extent of such provision be laid down, but some indication should be given as to the forms in which it should be provided in order to keep food in good condition.

There exists also a need for general storage space, particularly in the case of very small houses designed to comply with the minimum standards, for if no general storage space is provided in such houses, articles such as bicycles, perambulators, washtubs and other household paraphernalia tend to clutter up the limited space available in the rooms, to the great inconvenience of the occupants.

Size of Rooms

Having postulated type and number of rooms required in the dwelling to satisfy the needs of various sizes of family, there remains the need to work out the minimum size of each room in terms of its main function. In the case of sleeping rooms this is usually the minimum volume of air space per person in order to maintain health. At the present time, this is the approach on which the definition of overcrowding and slum conditions is based, but, unfortunately, as the Research Committee on Minimum Standards of Accommodation will point out, there appears to be no unanimity as to the minimum limit, which is found to vary from 200 to 400 cubic feet per person in different Acts and Regulations. In view of the absence of evidence on this point, it is considered reasonable for the meantime, to accept the minimum laid down in the Slums Act, viz.: 400 cubic feet per person.

Having provided for the requirements of health, the minimum space standards for the various rooms should be sufficient to accommodate the minimum quantity of furniture needed for the fulfilment of the normal function of the room, and to allow for ease of movement within the room.

In its studies on this problem the Research Committee discovered that in bedrooms designed in strict conformity with the present Slums Act there was insufficient space for the normal furniture, and too little space was left over for dressing and making beds. In the light of this observation, the minimum standards which it will recommend for bedrooms will be slightly in excess of the minimum required under the Slums Act, to enable them to provide adequately for the functional requirements in addition to their being satisfactory from the standpoint of health.

The living space to be provided in addition to the bedrooms, which the Research Committee desires to see incorporated in future regulations governing minimum housing standards, is likewise calculated as a result of planning studies designed to determine the minimum areas required to accom-

modate the necessary furniture and to allow reasonable freedom of movement within the room. Naturally, such living space, which includes within its total area the kitchen, dining space and general living space, will bear some relation to the number of people in the family. So a sliding scale will be proposed for this area, which will be larger in houses with a large number of bedrooms and smaller in those with few bedrooms.

Standards of Efficient Planning

It is of equal importance so to plan the various rooms in relation to one another as to provide for the minimum of wasted space and the minimum of inconvenience to the occupants. This will greatly ease the difficulties of family life under the somewhat congested conditions inevitable in minimum-sized dwellings, and will serve in addition to introduce an element of economy.

(This address will be concluded in our April issue).

PUBLICATIONS RECEIVED

SOUTH AFRICAN STANDARDS INSTITUTION

Standard specification for creosoted wooden Telephone, Telegraph, Electric Light and Power Transmission Poles (Price 5/- from the S.A. Bureau of Standards, Private Bag 191, Pretoria).

In a country so beset as South Africa with insect pests of all kinds it is manifestly essential that wooden poles carrying communication and power lines shall be adequately protected. Mere painting and spraying are insufficient. This specification applies to wooden poles, obtained from exotic timber grown in South Africa and **impregnated** with creosote.

After dealing with *definitions* and *freedom from defects*, the specification sets out the maximum tolerance for *splits*, the maximum deviation for *sweep* and lays down conditions regarding *swellings*. Tables indicate the standard dimensions for poles and minimum strength loads. There are also sections dealing with impregnation, labelling and marking, inspection and rejection, sampling, methods of testing and strength-groups by species.

SOUTH AFRICAN BUREAU OF STANDARDS

Code for protection of Buildings from Lightning. (Price 5/- from the S.A. Bureau of Standards).

In the introduction to this specification it is stated: "Atmospheric disturbances such as lightning occur on such a vast scale and are attended by so many variables that, even with the best knowledge and experience available, they cannot be controlled, nor can more be done than to provide the best defence practicable consistent with economy. Rigid rules cannot be framed to meet all needs and accordingly the code must be regarded as being a set of recommendations which, if applied with common sense, will fulfill their purpose."

This specification, which is likely to be of extreme value in the high-veld areas especially, covers not only buildings but also livestock fences and trees. It does not, however, deal with the protection of electric cables nor of buildings with explosives or highly inflammable contents.

The codes which deals with design considerations, inspection and maintenance, as well as methods of resistance testing, contains technical provisions to be applied by contractors.

Specification for Wax Floor Polishes; solvent type: liquid and paste. (Price 5/- from the S.A. Bureau of Standards).

This specification is based upon Federal Specification P.W. 158, modified to suit local conditions. Apart from the general and detailed requirements for both liquid and paste polishes to come up to specification, sections also deal with containers, sampling, methods of analysis and testing, as well as labelling.

Specification for Standard Sizes for Doorlocks. (Price 5/- from the S.A. Bureau of Standards).

This specification is to be reviewed after 30th June, 1949. As it only prescribes dimensional requirements the Standards Council's standardization mark cannot be used in connection with it. The purpose of the specification is to provide standard dimensions for a range of doorlocks, with the object of facilitating interchangeability. Apart from specifications, relating to materials, sheet metal thicknesses, castings, dimensions and workmanship, the major portion is devoted to drawings. These illustrate seven different types of lock, including Upright two-bolt mortice, Upright rebated two-bolt mortice, Horizontal two-bolt mortice, Horizontal rebated two-bolt mortice, six-inch rim, mortice latch and Dead mortice types.

Nomenclature for South African Home Grown Timbers. (Price 5/- from S.A. Bureau of Standards).

This specification consists of a series of tables, with an index, giving the standard and "other names," with botanical species, natural habitat and weight (in pounds per cubic foot, air dry) of all South African grown timbers. As the foreword says: "Reference to this code in contracts, specifications and other documents implies a guarantee that any timber covered by such reference is effectually identifiable with the botanical species against which the standard name used applies."

Specification for graded South African Softwood Timber. (Price 5/- from S.A. Bureau of Standards).

Within the past decade local softwood log production has increased from some 3 million to 25 million cubic feet annually. Though the timber itself is of excellent quality, a fairly high percentage of immature logs is included. Some of

NEW MAPS FOR OLD

An air survey of the Buckingham Palace and St. James's Palace area. A section of the new 50 inches to the mile maps now being prepared in Great Britain for Town Planners, Architects and Borough Surveyors. Essential to the planners in determining where the four million new houses, required in Britain during the next decade, are to be built, it will, nevertheless be 15 years before the whole series is finished. The last complete survey of England took place fifty years ago.

the timber, too, has been supplied in unseasoned condition and poorly sawn or manufactured. To place the grading of local timber on a sound basis this specification was prepared.

Besides a classification of timber there are graded specifications given for floor boards, floor blocks, ceiling, lining and weather boards, as well as moulding, amongst other types. Methods of testing for moisture content and density, together with the measurement of defects, are also included.

Code of Practice for the Application of Timber Preservatives. (Price 5/-, S.A. Bureau of Standards).

The discovery, in recent years, that the European House Borer is distributed in South Africa over a wide area has brought home the extremely urgent need for proved methods of timber preservation. No less serious are the West Indian drywood termite, the Death-Watch and Powder-Post beetles and the indigenous white ants. Means of combating these pests, as well as dry rot and other forms of wood-destroying fungi are therefore important.

In the specification will be found the properties of various types of preservatives and their correct method of application, together with a description of the process involved and of recommended treatments.

Tentative Specification for D.D.T. Insecticides. (Price 5/-, S.A. Bureau of Standards).

This specification covers dusts, solutions, concentrates, pastes and powders. It deals with containers, labelling, marking, methods of chemical analysis and biological assay.

A Test Room for the Study of Heat Transmission through Building components under conditions of Periodic Heat Flow. Paper by A. J. A. Roux, D.Sc. (Eng.), B.Sc. (Hons.), A.M.(S.A.)I.E., (National Building Research Institute, Price 1/-).

This paper describes the constructional details, control system and method of operation of a test room which was developed to study the heat transmission characteristics of different types of walls and roof ceiling combinations under conditions of periodic heat flow resulting from variations in intensity of solar radiation and air temperature. A description is also given of the instruments used and the various measurements which are being made to correlate the experimental results with theoretical analyses.

The first of a series of papers, on investigations into heat transmission through the various elements of buildings under practical conditions of solar radiation, air temperature and wind velocity, the actual experimental results will be dealt with subsequently.

Although similar test rooms and buildings have been erected at Garston, Greenwich and elsewhere overseas, this is the first time full scale scientific experiments of this type have been carried out with South African materials under local conditions.

SOUTH AFRICAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

LIBRARY ACCESSIONS

THE Library Accessions List, issued by the South African Council for Scientific and Industrial Research contains a reference to publications dealing with subjects of importance and interest to the Architect and Civil Engineer. Many of the publications listed were received from the Union's Scientific Missions in London and Washington.

It should be noted that certain documents have been passed to professional institutions which have now built up a collection of works of reference covering highly specialised fields. This accessions list indicates the location of works that have been passed to the appropriate Institution, to whom application for their loan should be made. All other publications listed may be borrowed by applying to the South African Council for Scientific and Industrial Research, Library and Information Division, P.O. Box 395, Pretoria. Publications that are considered to be of interest to our readers are enumerated below together with the relevant reference and classification numbers.

ACOUSTICS.

RETTINGER, Michael.
Applied architectural acoustics . . . . New York, Chemical publishing co., inc., 1947.
plates, tables, diagrams.

Reference 32/3. Classification 534.84.

AFRICANS, EMPLOYMENT. Johannesburg.

WITWATERSRAND, University. Department of Commerce. Industrial research section, Johannesburg.
Native urban employment : a study of Johannesburg employment records, 1936-44 . . . Johannesburg, University of the Witwatersrand, 1948.
Main sections: Introduction: native labour in the South African economy ; a classification of natives in Johannesburg; The flow of natives through Johannesburg employment ; The Central Pass Office records as a means of measuring the movement of native labour; the movement of native labour through Johannesburg, 1936-44 ; changes in the employment and structure of the Johannesburg native labour force; the Johannesburg job; native labour in certain Johannesburg jobs; summary and conclusions. **(Not available on loan).**

Reference 32/6. Classification 331.79(.96).

AIRFIELD CONSTRUCTION.

Great Britain. Department of scientific and industrial research, Road research laboratory.
Soils, concrete and bituminous materials: a record of an

instructional course given to officers of the R.A.F. airfield construction service at the Road Research Laboratory, Department of Scientific and Industrial Research, July-August, 1943. (Harmondsworth.)
Illus., tables, diagrams.
Reference 32/9. Classification 629.139.

ALUMINIUM FABRICATING EQUIPMENT.

BRITISH intelligence objectives sub-committee.
German aluminium fabricating equipment, reported by : E. S. Greenwood . . . and N. P. Taylor . . . London, H.M. Stationery Office, 1946.
(Copy also in Commerce and industries).
Reference 32/12. Classification Pam. 669.71.

ART GALLERIES. Lighting.

ILLUMINATING engineering society, New York. 1945.
Art Gallery lighting: report of the Committee on art gallery lighting of the Illuminating engineering society.
Illus., table, diagrams. Reprinted from Illuminating Engineering. Vol. XL no. 1. January, 1945.
Reference 32/19. Classification Pam. 628.973 :727 :71.

ASBESTOS INDUSTRIES.

BRITISH intelligence objectives sub-committee.
Asbestos consuming industries in Germany by J. R. Mooney and Carl Brudman. 2276 . . . London, H.M. Stationery office. (1947).
(Copy also in Commerce and Industries).
Reference 32/20. Classification Pam. 679.867.6(43).

BRICKS.

GREAT Britain. Department of scientific and industrial research. Building research station.
. . . Clay building bricks: their manufacture, properties and testing, with notes on efficiency of brickwork, by B. Butterworth.
London, H.M. Stationery Office, 1948. (National building studies bulletin, no. 1).
Plates, tables, diagrams.
Reference 32/29. Classification Pam. 691.47+666.711.

CAPE TOWN FORESHORE PLAN.

UNION of South Africa. Cape Town foreshore joint technical committee.
The Cape Town foreshore plan: final report of the Cape Town foreshore joint technical committee, June, 1947. Cape Town and Pretoria, Government printer, 1948.
Illus., photo., plans, tables.
Reference 32/39. Classification Pam. 711.5(687).

CEMENTS.

MINNESOTA University. Engineering experiment station.
. . . Laboratory studies of asphalt cements, by Fred. C. Lang and T. W. Thomas . . . Minneapolis, Engineering station, 1939.
Main sections: Tests of Ottawa sand mixtures; Tests of sheet asphalt specimens; hardening of asphalts; displacement of asphalt by water; physical and chemical tests on asphalt cements; special tests; studies of existing pavements.
Reference 32/40. Classification Pam. 625.85.

CLAY, South Africa.

BOSAZZA, V. L.
The petrography and petrology of South African clays . . . Johannesburg, Publ. by the author.
Front., plates, tables, diagrams.
Reference 32/50. Classification 552.52(68).

CONCRETE.

UNITED STATES. National bureau of standards.
Properties of some lightweight-aggregate concretes with and without an air-entraining admixture, by Perry H. Petersen. Washington, Government printing office, 1948. (Building materials and structures report BMS 112).
Illus., tables.
"The physical properties of several lightweight aggregate Portland cement concretes made with burned shale or expanded slag were investigated at the National Bureau of Standards. Three grades of concrete using each aggregate were made . . . Also included are the coefficients of thermal expansion, shrinkage, and values for change in length due to wetting and drying."
Reference 32/53. Classification Pam. 691.322.

ELECTRIC GENERATOR SETS.

GREAT Britain. Codes of practice committee for civil engineering, public works and building.
. . . Private electric generating plant . . . London, British standards institution, 1948.
Reference 32/70. Classification Pam. 621.311.1.001.3.

ELECTRIC LIGHTING.

GREAT Britain. Codes of practice committee for civil engineering, public works and building.
The provision of electric lighting in dwellings . . . London, British standards institution, 1948.
Table, diagrams.
Reference 32/72. Classification Pam. 696.6.001.3.

FLATS

ABEL, Joseph H., and Fred N. Severud.
Apartment houses; by Joseph H. Abel and Fred N. Severud; with special chapters contributed by Clifford Stock, H. M. Nugent and W. H. Easton, Junior, and Alfred Geiffert. New York, Reinhold publishing corporation, 1947. (Progressive Architecture library).
Illus., plans, tables, diagrams.
Reference 32/85. Classification 728.2.

FLOOR WAX.

UNITED STATES. Department of commerce. Office of technical services. Inventions and engineering division, Technical advisory service.
Formulae for making non-slippery, self-polishing floor wax. Washington, Office of technical services.
These formulae are taken from Bennett's Chemical formulary.
Reference 32/86. Classification Pam. 667.82.

FLOORING.

GREAT Britain. Ministry of Works.
The new pitch mastic flooring specifications, by Thos. Whitaker . . . London, Ministry of Works, 1948.
Reference 32/87. Classification Pam. 69.025.331(083.75).

FOUNDATIONS.

GREAT Britain. Codes of practice committee for civil engineering, public works and building.
. . . Foundations and substructures for houses, flats and schools of not more than two storeys . . . London, British standards institution, 1948.
Main sections: Materials, appliances and components ; Design considerations; work off site; work on site: Inspection and testing: Maintenance.
Reference 32/90. Classification Pam. 624.15.001.3.

HOOL, George A. and W. S. Kinne, **jt. eds.**
Foundations, abutments and footings; compiled by a staff of specialists; editors-in-chief George A. Hool and W. S. kinne . . . revised by R. R. Sipprodt and E. J. Kilcawley . . . second edition . . . New York, McGraw-Hill Book Co., Inc., 1943.
Illus. (photos) diagrams.
Reference 32/91. Classification 624.1.

GREAT Britain. Ministry of Works.
Summary report of the Ministry of Works for the period 9th May, 1945, to December 31st, 1946. London, H.M. Stationery office, 1947.
Tables.
Reference 32/95. Classification Pam. 354.45(42)(047).

HEATING. Panel system.

CANADA. National research council.
Report on the work carried out in the 'panel' or 'radiant' heated test buildings at the National research council laboratories, Ottawa, during the winter 1947-1948, by C. D. Niven . . . Ottawa.
Graphs.
"Conditions were investigated in a test building heated alternately by radiators and by the floor or wall panel heating. Evidence is given to show that more heat can be obtained from a heated floor than is usually assumed, provided the floor is heated right up to the edge . . . Great improvement in comfort can be effected by use of ceiling ventilation when the room is overheated due to solar radiation."
Reference 32/96. Classification Pam. 697.001.4; 061.6.(73).

HIGHWAY CONFERENCE, 1947.

COLORADO. University. Engineering experiment station.
. . . The twentieth annual highway conference of the University of Colorado. University of Colorado, 1947.
The three main papers included in this report are: Planned highway transportation, by Herbert S. Fairbanks; planned highway transportation as applied to New Mexico, by A. R. Abelard; Soil tests as a basis for subgrade evaluation, by Harold Allen and E. A. Willis.
Reference 32/97. Classification Pam. 625.7/8(061.3).

HOUSING.

CENTRAL Mortgage Housing Corporation. Economic research division, Ottawa.
Housing progress abroad. a quarterly review: vol. III no. 2. "This issue . . . deals with rural housing conditions in Great Britain, the United States, Australia, New Zealand, South Africa and Sweden, and reviews housing legislation.
Reference 32/100. Classification Pam. 728.6.

IRRIGATION WATER.

UNITED States. Bureau of reclamation.
Manual for measurement of irrigation water: a manual for irrigationists prepared by Branch of design and construction, Branch of operation and maintenance. Washington, Government printing office, 1946.
Illus. (photos) tables, diagrams (some folding).
Reference 32/110. Classification 626.824.

LEAD.

BRITISH intelligence objective sub-committee.
Manufacture of white lead: reported by H. Causer and J. S. Frith, London, H.M. Stationery Office, 1947.
Illus., tables, diagrams.
Sections: Process as applied by Vereinigte Farbwerke A. G. Dusseldorf.
Process as applied by Hoelemann and Wolff, Osterode.
Reference 32/116. Classification Pam. 661.85.1.7(43).

PAINT.

American chemical society. Division of paint, varnish and plastics chemistry.
Papers presented at the 25th anniversary meeting, Chicago, April, 1948.
Illus., tables, diagrams.
This is a reprint booklet.
Reference 32/132. Classification 667.6/.8+679.5(042).

PLASTIC MATERIALS.

BRITISH intelligence objectives sub-committee.
Investigation of methods of development and evaluation of new plastic products in certain German establishments. London, H.M. Stationery Office, 1946.
"The particular interest of the investigators was the organisation of and the provision for the intermediate stages which must lie between the original synthesis of a new polymer and its manufacture and use on a commercial scale."
(Copy also in Commerce and Industries).
Reference 32/141. Classification Pam. 679.5(43).

REFRIGERATORS, ELECTRIC.

GREAT Britain. Codes of practice for civil engineering, public works and building.
Installation of vapour compression type domestic electric refrigerators. London, British standards institution, 1948.
Tables, diagrams.
Reference, 32/158. Classification Pam. 621.564.92.001.3.

ROADS.

COLLINS, H. John and C. A. Hart.
Principals of road engineering . . . London, Edward Arnold and co., 1947.
(The Roadmaker's Library, vol. 6).
Tables, diagrams, illus., plates.
Reference 32/160. Classification 625.7/8.

ROTPROOFING.

CANADA. National research council.
The rotproofing of textiles and related materials — a survey of literature by Muriel W. Weatherburn . . . Ottawa, National research council, 1947.
Reference 32/163. Classification Pam. 620.197.191.8 :677.

RUBBER.

BRITISH intelligence objectives sub-committee.
Properties and testing of rubber ; interrogation of Dr. P. Stöcklin, at Beltane schools, S.W. 19. London, H.M. Stationery Office, 1946.
Main sections: Methods of chemical analysis: relation between chemical structure and physical properties; bonding of rubber to metal; standardisation of mixing procedure; hardness testing; abrasion testing; tensile testing; fatigue testing; mechanical testing, etc. (Copy also in Commerce and Industries).
Reference 32/164. Classification Pam. 678.77(43).

STATISTICAL METHODS.

SIMON, Leslie E.
An engineer's manual of statistical methods . . . New York, John Wiley and sons, inc. 1945.
Tables, diagrams. (Not available on loan).
Reference 32/179. Classification 519.2 :62.

STEEL.

GREAT Britain. Codes of practice committee for civil engineering, public works and building.
The structural use of steel in buildings . . . London, British standards institution, 1948.
Main sections: Materials, appliances and components, design considerations; work off site; work on site; inspection, maintenance.

SOUTH AFRICA. Steel and engineering industries federation of S.A.
Classified directory of members and their manufactures. Johannesburg.
Reference 32/182. Classification Pam 62+669.14(058) (68.01).

STRUCTURAL, ENGINEERING.

HOOL, George A. and W. S. Kinne. Jt. eds.
Structural members and connections: compiled by a staff of specialists: editors in chief George A. Hool and W. S. Kinne, revised by R. R. Zipprodt . . . and F. N. Menefee . . . second edition. New Cork, McGraw-Hill book co., inc., 1943.
Reference 32/183. Classification 624.

SUTHERLAND, Hale and Harry Lake Bowman.
Structural Design . . . New York, John Wiley and sons, inc., 1938.
Diagrams. 7 charts in pocket at end.
"This book is intended to contain all the material essential for introducing the student of structural engineering to the fundamentals of the theory and practice of design in steel and timber, excepting only the data in the handbook of the steel manufacturer . . ."
Reference 32/185. Classification 624.041.

SUTHERLAND, Hale and Harry Lake Bowman.
Structural theory . . . third edition. New York, John Wiley and sons, inc. (1947).
Main sections: Reactions and stresses; graphic statics; roof trusses; truss and girder bridges; long-span bridges; lateral bracing and portals slope and deflection; rigid frames; wind stresses in tall building frames; indeterminate trusses; secondary trusses; space frameworks.
Reference 32/186. Classification 624.042.

TIMBER.

HANSEN, Howard J., ed.
Timber engineer's handbook. New York, John Wiley and sons., inc. 1948.
Main sections: Factors, affecting strength; grading rules and working stresses; standard terms and abbreviations; sizes and properties of sections; weights; loadings; simple beams; continuous beams, trussed beams, columns — solid; spaced columns; combined stresses; fastenings; trusses; glued laminated construction; plywood; floor systems; buildings; poles and piling; protection and maintenance.
Reference 32/192. Classification 624.011.1.

WOOD.

TECHNICAL association of pulp and paper industry, New York.
Nature of the chemical components of wood; a symposium held under the auspices of the Fundamental research committee Tappi, the Institute of paper chemistry, Appleton, September 3 to 5, 1947. Edited by Clarence J. West. 1948.
Tables, diagrams.
Reference 32/202. Classification 674.54.

The first railway bridge, ever to span the River Tigris, now approaches completion.

TECHNICAL NOTES

New Flooring Technique

WITH South Africa, up till recently, embarked upon the biggest building and development programme in its history, new constructional techniques and new applications of modern materials are of special significance to the country. Important among such inovations is rubber flooring, introduced into South Africa by the Dunlop Company.

This new type of flooring — a scientific rubber compound spread in a continuous, even layer to form a smooth floor surface — is rapidly making its mark alike in private housing and in big public buildings such as schools, hospitals, offices, restaurants, churches, cinemas, hotels, factories and even ships.

The new rubber flooring — which goes under the name of Semtex — possesses characteristics which make it at once versatile and dependable. It is :—

1. Quiet and resilient — the natural cushioning effect of rubber is preserved, so that fatigue from prolonged standing or walking on this floor is reduced to an absolute minimum.

2. Damp-proof — normal rising damp has no effect at all on this floor, and where there is any known pressure of water beneath, special treatment against it can be given in the laying of the floor.

3. Fire-resistant — this floor does not support combustion in any way.

4. Non-porous — spilled liquid cannot seep through or into this flooring.

5. Non-slip — even when wet.

6. Non-corrosive — there is nothing in this flooring which can set up corrosion of the sub-floor.

7. Vermin and germ-proof — because Semtex floors adhere firmly to the sub-floor foundation and are jointless, there is no harbouring of vermin or germs.

8. Ease of maintenance — these floors respond quickly to light sweeping and washing. The nature of the surface is such that a minimum of dust and dirt collects.

The principal type of rubber floor is the Semtex fleximer jointless floor. This consists of a scientific compound of natural rubber latex or dispersions of synthetic rubber or resin mixed cements as matrices. The flooring is laid cold by trained Semtex craftsmen, without risk of fumes or fire. It is spread by float on level sub-floors to a normal thickness of a quarter of an inch. Within 48 hours, the floor is ready to receive light traffic, although a week should be allowed before it is subjected to heavy traffic.

The chief advantage of this fleximer flooring is that its composition can be varied to suit specific requirements . This is particularly valuable in industrial floors where conditions can vary greatly according to the type of activity going on in the particular factory. Thus, special grades of flooring can be laid to suit conditions of constant dampness, presence of chemicals, sustained heat or cold, vibration, grease and so on.

Special covings for the joints against walls and partitions are available as are borders for decorative purposes.

The other main branch of Semtex floorings are decorative tiles and inlaid floors which are available in a wide range of sizes, designs and colours. These floors can be tailored to individual design and colour schemes and combine good taste with long wear. They are ideal for the more formal entrances and halls of public buildings and anywhere that decoration is important.

The new Semtex rubber floorings are laid only by Dunlop craftsmen. Flooring divisions of the Dunlop organisation are already in being at Durban and Port Elizabeth, with further branches at Johannesburg and Cape Town expected soon.

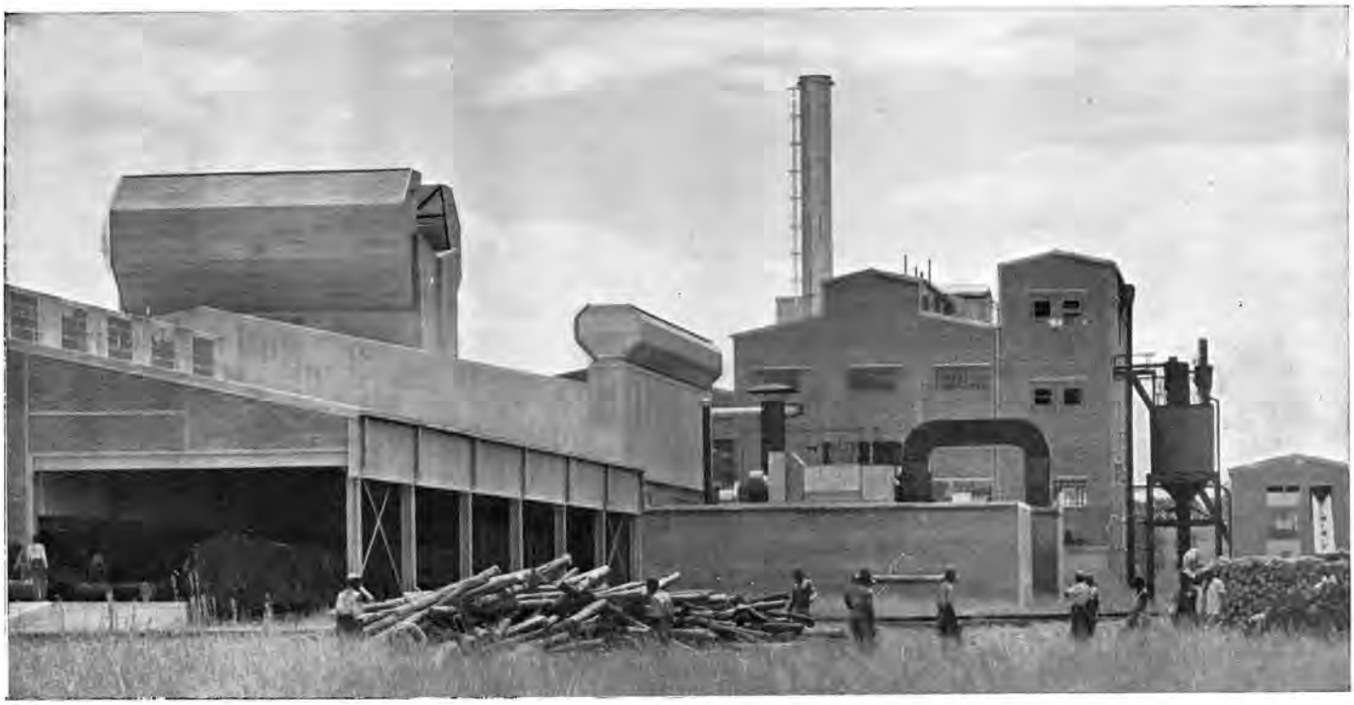
One of the first big South African undertakings was at Pyott's new biscuit factory at Port Elizabeth where 2,500 square yards of fleximer flooring was laid, and 6,000 yards are now being laid at Sargents Shoe Factory, also in Port Elizabeth.

New Universal Heavy Duty Drills

What is claimed to be an entirely new conception of the term "heavy duty," as applied to portable electric tools, in the ½", ⅝" and ¾" range of sizes, has been produced by the British manufacturers, S. Wolf and Co., Ltd.

Figures obtained under the most rigorous conditions in scientific and on-site tests are described as setting a new and higher standard in portable electric drill performance and power. For example the ½" model, drilling at full load to maximum capacity in steel, is said to have averaged just 2" per minute penetration, a figure well in advance of any previously achieved with this type of tool. The secret of this success, it is stated, lies in the technical development of the power weight ratio and maintenance of efficient drilling speed and torque.

Aluminium alloy for the motor frames and gear boxes, nickel chrome molybenum steel for the gears and double silk-covered enamelled copper wire for the motor windings are among the materials used. A specially designed switch, of robust construction has been embodied. For operator safety, a final flash test of 2,000 volts is given to each machine. Windings are non-hygroscopic and the machines can be used in extremes of temperature and humidity.



The new Masonite factory at Estcourt, Natal, opened by the Hon. C. N. Havenga, on 2nd April, 1949.

Duafuel Diesel Engines

The Nordberg Manufacturing Company of U.S.A. have just issued a new bulletin decribing their Type DB 24 Diesel engines. These are designed both for stationary and marine service and operate either on oil or on petrol with pilot oil (Duafuel). Both supercharged and non-supercharged types are available. The ratings range from 815 to 1,900 horsepower at speeds of 277 and 300 r.p.m. Sizes range from five to eight cylinders. The engine is a vertical, four-cycle, single acting, trunk piston type with 16½" bore and 24½" stroke. The inherent advantages of supercharging are described.

IMPORTANT NEW SOUTH AFRICAN FACTORY

A Welcome Addition at a Critical Time

The South African factory of Masonite Africa, Ltd., opened by the Minister of Finance, on April 2nd, is an important acquisition to the increasingly industrialised Natal Midlands. Apart from offering employment to over 100 European workmen, it will provide an outlet for the products of wattle farmers as far away as Greytown. There is a possibility that the chemical by-products of the Masonite process (not fully explored even in the United States factories) may provide further industrial opportunities at a later date.

The plant and installation at Estcourt have cost something in the region of £1,250,000. The factory can, as a result, boast of equipment as good as any in the world and certainly newer than most. Production, when the three-shift day is introduced in the near future, will be set at 60,000,000 square feet per year. This, it is estimated, will be enough to satisfy South African needs and thereby save the country nearly a million pounds in dollars — the cost in the previous years of importing the hardboards which the local factory will now produce.

The Masonite process for producing Presdwood in thicknesses which vary between $\frac{1}{8}$" and $\frac{5}{8}$" is, in essence one of taking natural wood apart and putting it together again in a stronger, harder, more uniform structural form. This is achieved by exploding wood chips in a gun and pressing the resultant pulp in steam-heated presses. The explosion is managed by introducing steam at a pressure of about 400 lb. to the square inch into a steel tube and releasing the force thus created by opening a small valve. Wood treated in this way is reduced to its most elementary structural components — the ligno-cellulose bulk and the lignin, or binding agent. No further ingredients are required for the final product.

Varying conditions of pressing and tempering produce Presdwoods suitable for differing jobs. It can be used for panelling and interior decoration, etc., for building purposes, as shuttering for concrete forming and for body-building in the automobile industries, and there are varieties, known as Die Stock and Benelex, which are prepared for use in tooling-up processes and electrical installations respectively.

The South African factory, which will enjoy the results of research in the laboratories of the American Company, is an interesting venture in which South African and American capital has co-operated.

RAND EASTER SHOW

On their stands Nos. 1 and 2, Thos. Barlow & Sons (S.A.), Ltd., have engineering exhibits for farm, industrial and constructional work. As sole distributors in South Africa for "Caterpillar" and Allied Equipment, Barlow's have given this well-known line of diesel tractors, engines and earth moving equipment pride of place on the show.

A massive "D-8" "Caterpillar" tractor with bulldozer coupled to a "170" scraper, is the chief exhibit. This tractor is rated at 130 horespower and has a maximum drawbar pull

of 28,700 lbs. Next to this giant stands its smaller brother, the "D-4" tractor, often described as the farmers' right-hand man because of its versatility. This tractor is rated at 43 horsepower and a maximum drawbar pull of 9,450 lbs. and can be used for ploughing, discing, harrowing, levelling, logging, ditching, dam building and a host of other farming jobs.

Of interest to the contractor and constructional man are the "Traxcavator" and "Athey" Mobiloader machines for earth moving. Both are built on sturdy non-oscillating "Caterpillar" Diesel tractors, and have many unique and outstanding features. The Mobiloader has finger-tip hydraulic controls and the "overhead" action of the bucket steering parts kept at a minimum. The new and improved "Traxcavator" is a compact, low-cost digging and loading machine. It gets a full bucket at every trip and dumps without spilling. This machine is excellent for digging, loading, levelling, backfilling, bulldozing and drawbar-work at unbelievably low cost.

A "Caterpillar" display would not be complete without showing the famous Diesel Electric Sets and Engines. Messrs. Barlow's have therefore given prominence to these and have the "D13000" 75 Kw. and "D318" 45 Kw. electric sets on show together with a "D8800" industrial engine suitable for pumping purposes.

Among the many exhibits of interest to the farmer are the "Killefer" Panbreaker, Rotary Scrapers, Disc Harrows, "Kay Brunner" Landlevellers and "Rex" Pumps, etc. Builders too, will find the "Rex" Concrete Mixer of great interest while industrialists are sure to be attracted by the display of time-saving "Hyster" Lift Trucks and Karry Kranes. For material handling these machines are unique and are the only complete line of industrial trucks fitted with floor-saving pneumatic tyres. The Lift Trucks have load capacities of from 2,000 lbs. to 15,000 lbs. and will lift as high as 24 feet. The boom of the Karry Krane can be quickly adjusted to any of 5 positions and will carry comfortably a load of 10,000 lbs.

In all, the Barlow exhibit is well-balanced and has something of interest for everyone.

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.

NOTE: S.A.R. &. H. Tender Board address is: 715, P.F.A.C. Building, 15, de Villiers Street, Johannesburg.

BUILDING, ETC.:

Kroonstad, Orange Free State: Voortrekker Hospital — new maternity block. Public Works Department, Pretoria. Contract P.W.D. 184. Due, 12/4/49.

Uitenhage Municipality: The erection of a temporary maternity block, Replacement Hospital, Mosel Township, Uitenhage, for the Uitenhage Hospital Board. Architects: Siemerink and Brinkman, 72, Main Street, Port Elizabeth. Cape Provincial Tender Board, Cape Town. Amended to, 15/4/49.

Uitenhage Municipality: The erection of a temporary nurses' home, Replacement Hospital, Mosel Township, Uitenhage, for the Uitenhage Hospital Board. Architects: Siemerink and Brinkman, 72, Main Street, Port Elizabeth. Cape Provincial Tender Board, Cape Town. Amended to: 15/4/49.

ELECTRICAL EQUIPMENT, ETC.:

Bloemfontein Municipality: E.H.T.—O.H. line insulators Enquiry 4/1949 Town Engineer, City Electrical Engineer, Bloemfontein. Due, 2/5/49.

Durban Municipality: Street light fittings. Electrical material for cable jointing, etc. Electricity Department. Contract No. E. 2201. Due, 29/4/49.

Durban Municipality: One portable arc welding set. Contract No. E.2203. Due, 13/5/49. Electricity Department.

Transformers. Contract No. E.2204. Due, 20/5/49. Electricity Department.

Johannesburg Municipality: Fuse switch gear. Contract No. C. 76. Due, 21/4/49. S.A.R. Tender Board, 715 P.F.A.C. Buildings, de Villiers St.

Kleinmond Municipality: Electricty undertaking: supply, delivery and erection of the following material: Section A, Low tension switch gear; Section B, Low tension overhead net work; Section C, Street lighting; Section D, Consumers' service mains. Secretary, Village Board, Kleinmond (P.O. Kleinmondstrand). Contract No. E. 1/1949. Due, 11/5/49. (One copy of contract documents on deposit of £2-2-0 — extra copies at £1-1-0 each).

Nelspruit Municipality: Hydro electric plant, penstock and transmission line equipment: Plant, materials and execution of work in connection with the above. Consulting Engineers: Stewart, Sviridov and Oliver, Balgownie House, 66, Commissioner Street, Johannesburg. Contract E.3/1949. Due, 11/5/49. (Deposit of £3-3-0).

Springfontein Municipality: Electricity extensions — material. Town Clerk, Springfontein. Extended to: 11/4/49.

Stutterheim Municipality: Section D. H.T. 6.6 kv. Transmission line equipment with transformers, switchgear, etc. Town Clerk, Stutterheim. Due, 12/4/49. (Deposit of £3-3-0 — extra copies of contract documents at £2-2-0 each).

Utrecht Municipality: Supply and installation of the following: Section 1, Cable; Section 2, Transformer; Section 3, Switchgear and Fuse Boards; Section 4, Hard drawn copper wire; Section 5, Poles; Section 6, Sundries. (£3-3-0). Due, 14/4/49.

300 k.v.a. Transformers. Town Clerk, Edenvale. Extended 28/4/49; One weighbridge, 20 alternatively, 30 tons. Electrical Engineer, Klerksdorp. Due, 27/4/49.

ENGINEERING, ETC.:

Johannesburg Municipality: Air compressor. Contract No. C.42. Due, 14/4/49. Pumping plant. Contract No. C.41. Due, 14/4/49. Steam Locomotives class s.s. Contract No. 8277. Due, 11/8/49. Asbestos cement sheets. Contract No. D.8543. Due, 14/4/49.

George Municipality: 24″ steel pipes and specials, or **alternatively,** of 24″ spun iron pipes and cast iron specials. Form of tender A. 98/48. City Engineer, Cape Town. Due, 11/4/49.

Queenstown Municipality: Sewerage scheme: Supply, delivery and erection of the plant and materials under the 4 sections of the contract, as follows: Section 1: Pumping plant; Section 2: Equipment for sprinkling filters; Section 3: Equipment for rapid gravity sand filters; Section 4: Electrical equipment. Consulting engineers: Stewart, Sviridov and Oliver, Balgownie House, 66, Commissioner Street, Johannesburg. Contract S.3/1949. Due, 22/4/49. (Deposit of £5-5-0 — extra copies of documents at £2-2-0 per copy).

INDUSTRIAL SITES:

Epping Industrial Township: Offers for the purchase of industrial sites within the Epping Industrial Township. The upset price is £2,500 per acre. Tenders must be submitted on the prescribed form. Section 1. Town Clerk, Cape Town. Due, 29/4/49.

ROADS:

Divisional Council of Molteno: Roadmaking machinery: (a) 70/90 h.p. full Diesel engined crawler tractor equipped with double-drum winches and cable-controlled angle-dozer; (b) Cable-controlled rooter for the above-stated tractor, approximate weight 7,000 lbs. (c) 105 cubic ft. portable Diesel-engined compressor, one jack-hammer, $2\frac{5}{8}$″ bore, complete with 50 ft. hose air line lubricator, steels and jack bits or detachable points. **Note:** Tenders may be submitted for one or more items. Secretary, Divisional Council of Molteno. Due, 13/5/49.

WATER:

Beaufort West Municipality: One direct-acting steam-driven boiler feed pump capable of delivering 2,500/3,000 gallons of hot feed water per hour against a boiler pressure of 240 lbs. per square inch when supplied with steam at 200 lbs. per square inch gauge pressure. Town Clerk, Beaufort West. Due, 26/4/49.

Divisional Council of Namaqualand. The erection of a proposed water scheme for the local area of Port Nolloth, Division of Namaqualand. Secretary. Due, 20/4/49. (Deposit of £3-0-0).

Stellenbosch Municipality: Augmentation of water supply: Section 1: Pipes, valves, specials and fittings. Contract No. 1/1949. Consulting engineer: Ninham Shand, 806, Groote Kerk Buildings, Parliament Street, Cape Town. Due, 22/4/49. (Deposit of £5-0-0).

Irrigation Department, Pretoria: Reaming shells for diamond core drilling machine. Contract IRR.511. Due, 14/4/49. Controller of Stores.

Printed by Caxton, Limited, 265, Pretorius Street, Pretoria, for the proprietors and publishers, Public Services Publicity (Pty.), Limited, Norwich Union Buildings, Main Street, Johannesburg.

Supplement to
"Public Works of South Africa"

69 (05).
Series DIS-3.

INFORMATION SHEET

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

Sand-Lime Bricks

11. Q: Can sand-lime bricks be considered as satisfactory as ordinary burnt bricks for building?

A: Sand-lime bricks are made by mixing a small proportion of lime with a suitable sand, moulding the moistened mixture in a press and steam-treating the product in pressure vessels for several hours. Under these conditions lime combines with silica in the sand, forming a binder between the sand grains. The bricks so formed are then ready for use.

No attempt will be made here to catalogue quantitatively the various properties of sand-lime bricks as compared with those of burnt clay bricks. However, the two types of brick are similar in the following respects: strength, fire resistance, rate of water absorption, insulating value, density and durability.

Sand-lime bricks, as normally made, are a dull white. This feature which results in a uniformity of appearance, might sometimes be considered a disadvantage, but this can be overcome by colouring the bricks with suitable pigments during the mixing process.

The size and shape of sand-lime bricks as moulded, are maintained during manufacture and hence little variation in dimensions occurs. The quality of such bricks depends on the quality of the raw materials and the process used, as well as on the degree of control exerted. This is, of course, no less true for burnt bricks the quality of which varies over a wide range. Sand-lime bricks are extensively used overseas, and many countries, including Britain, have standard specifications for this material.

Hence it can be said that sand-lime bricks are considered an acceptable building material with general properties similar to those of ordinary burnt bricks, but differing in some respects. These differences should be taken into account for each specific application.

Underreamed Foundations

12. Q: What is an underreamed foundation and what are its special uses?

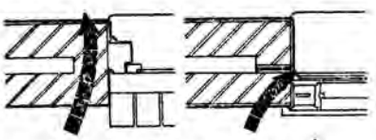
A: An underreamed foundation is a special type of cast-in-situ reinforced concrete pile foundation in which the pile base has been enlarged to increase the bearing capacity. The hole for the pile is bored with a power driven earth auger and when the desired depth has been reached the bottom of the hole is enlarged with a rotary reaming tool. Reinforcing bars in the form of a column cage are placed in the hole which is then filled with concrete.

This type of foundation is used for the construction of buildings on stiff clay soils which exhibit significant swelling or cracking with moisture changes and is widely used in Texas, U.S.A. The piles are used to carry the loads down to a level at which the moisture remains constant and the building is carried completely on the piles. Consequently movements in the upper crust of the soil do not affect the stability of the building.

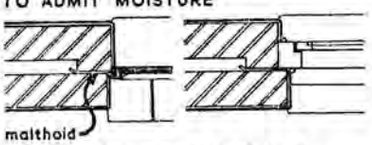
Detailing of Cavity Walls

13. Q: Is the common practice of closing the cavity in 11" brick walls with a cut header at door and window jambs a satisfactory detail?

A: Any detail which departs from the principle of maintaining either an unbroken cavity or a weather-proof barrier between exterior and interior is liable to fail and can be considered unsatisfactory. Experience of rainy climates overseas has shown that a vertical dampproof course in slate or malthoid at the jambs is a good practice. The simple details illustrated overleaf have been known, when properly carried out, to withstand severe wet seasons.



DETAILS OF JAMBS LIABLE TO ADMIT MOISTURE



DETAILS OF JAMBS SHOWING USE OF VERTICAL DAMP-PROOF COURSE.

Reducing the Heat Gain through Windows

14. Q: Does the practice of keeping the windows closed and the blinds down during the hot part of the day really result in cooler conditions in a building?

A: The effect of an internal shade in reducing the heat gain through a window depends to some extent upon its reflectivity and fit. For the usual type of buff-coloured roller blind the reduction is about 50 per cent. when fully drawn but on sunny days even with this reduction, a large proportion of the total heat gained by a building is still transmitted through the windows.

If windows are closed and blinds drawn in the middle of the morning, when indoor temperatures are still low, and remain closed until late afternoon, it can be expected that the thermal environment inside a well-insulated building with relatively few occupants will, throughout the day, remain cooler and more pleasant than if the windows were left open and unshaded. On the other hand, if windows and blinds are closed for only a few hours during the hot part of the afternoon, indoor conditions are likely to become increasingly unpleasant since an appreciable amount of heat will continually be added to already warm surroundings, and air movement will be rather sluggish.

Tests have demonstrated that external shading by means of awnings and screens is, in general, approximately twice as effective in reducing the heat gain through a window as the more common methods of internal shading. External shading has the additional advantage of permitting windows to be relatively unobstructed, thus not interfering over-much with the natural lighting of the interior.

Concrete Vibrators

15. Q: What are the advantages and disadvantages of using vibrators to place concrete?

A: *Advantages.*

(a) Vibrators can save money in labour, i.e. more concrete can be placed with less labour.

(b) Concrete of a drier consistency can be placed thus saving cement and reducing shrinkage.

(c) Sand and cement proportions can be somewhat reduced.

(d) A denser and more durable concrete is obtained.

Disadvantages.

(a) Shuttering must be stronger to resist extra pressure developed.

(b) Shuttering must be tight throughout to prevent the mortar in the concrete from being forced out through open cracks.

(c) Air bubbles are liable to form on the surface, but these can largely be eliminated by oiling the shuttering and by supplementary hand spading along the shuttering after vibration has been completed.

The actual savings obtained depend to a great extent on the contractor and types of materials. Average figures may be taken as: a reduction of from 40 to 70% of the man power required for spading concrete, a decrease of from 5 to 15% in the amount of cement required, and an increase of from 5 to 10% in the cost of shuttering.

W.P.—65484—12/2/49