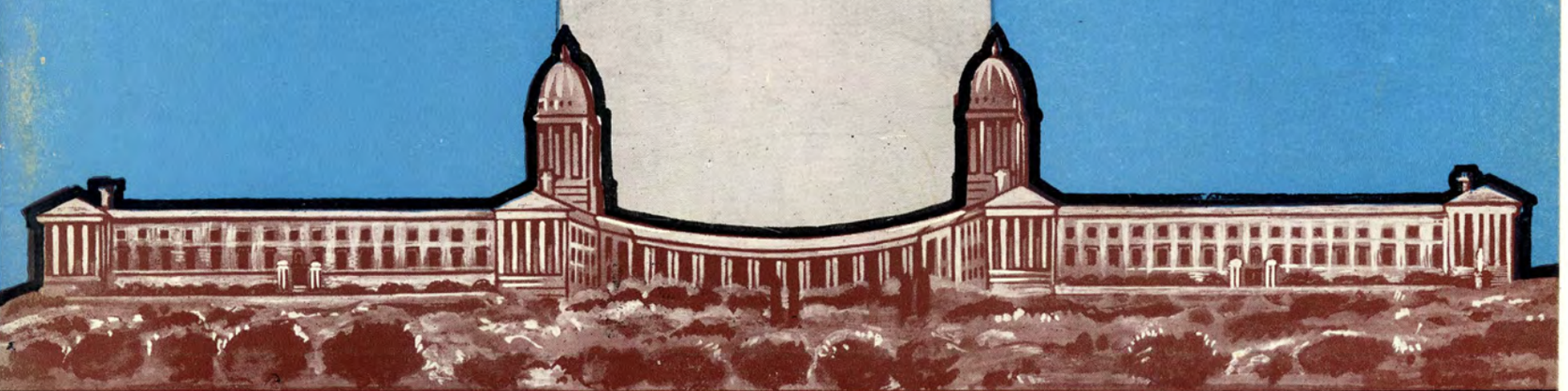
Vol. X. No. 63. FEBRUARY : 1949.

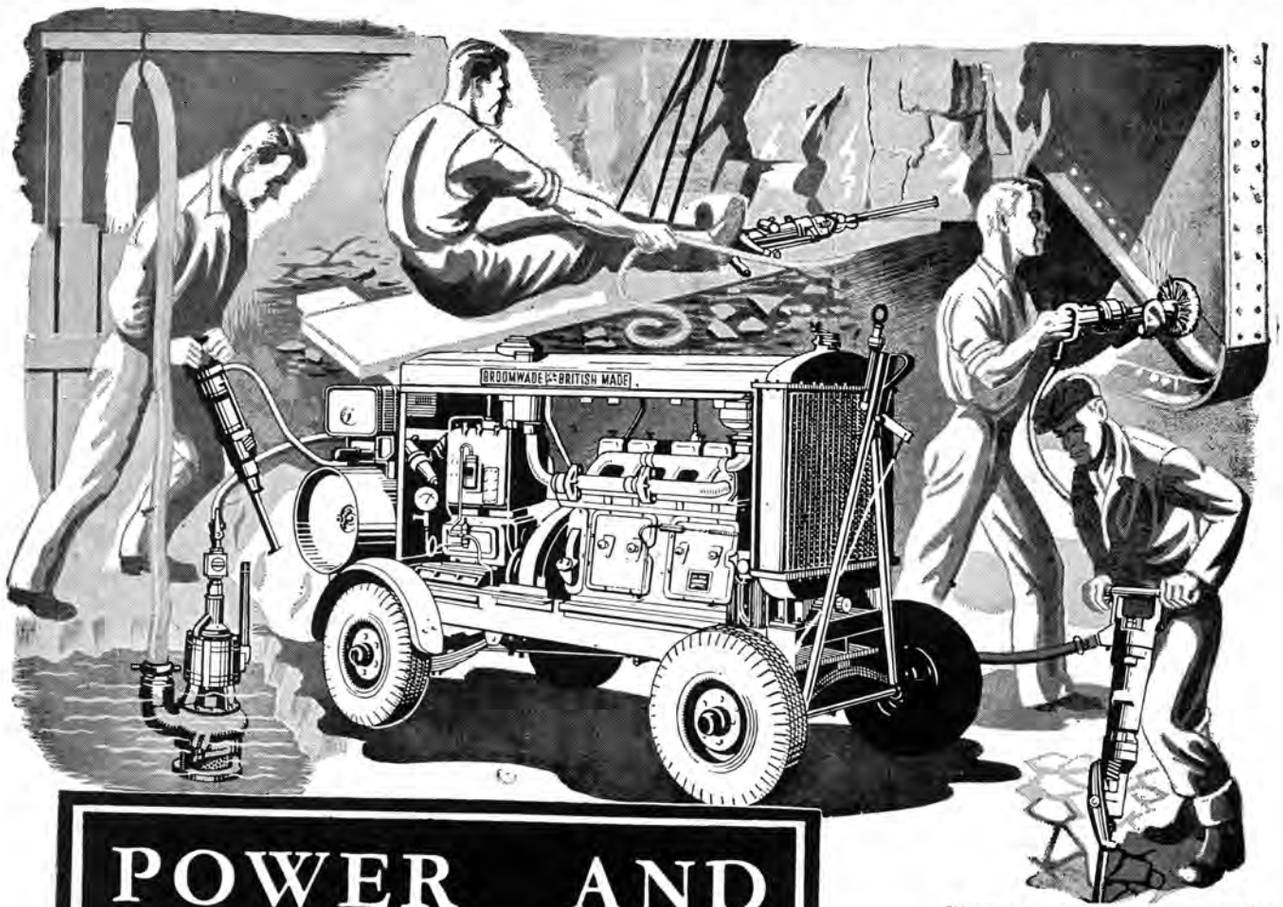
PUBLIC WORKS OF SOUTH AFRICA



Registered at the General Post Office as a Newspaper.

Price per Copy : 1/6

Subscription : 15/- per annum.



POWER AND PORTABILITY

Illustrated are typical everyday applications for BROOMWADE Equipment. The Air Compressor is a BROOMWADE Type SVD 2, Diesel Engine Driven Portable Plant.

Air Power affords a degree of portability unequalled by any alternative. There is practically no mechanical operation which cannot be carried out in any situation without preparation and with speed and economy. We shall be pleased to offer advice on the application of BROOMWADE Equipment to unusual requirements.

You are cordinally invited to visit our exhibit at the Rand Show, April 11th to 18th, Open Site No. 8/9, Block B.

"BROOMWADE"

AIR COMPRESSORS AND PNEUMATIC TOOLS

BROOM & WADE

(S.A.) (PTY.) LTD.

Managers: BALDWINS [S.A.] LTD.

10th FLOOR, MARITIME HOUSE, LOVEDAY STREET, JOHANNESBURG

Phone 34-2971/9. **P.O. Box 1189.**

Branches at Cape Town, Port Elizabeth, East London, Durban, Bulawayo and Salisbury.

Manufacturers of Stationary and Portable Air Compressors; also Pneumatic Tools, Rock Drills, Road Breakers, Rammers, Pile Drivers, Picks and Spades, Drilling Machines, Grinders and Sanders, Squeeze Riveters, etc., etc.

PUBLIC WORKS OF SOUTH AFRICA

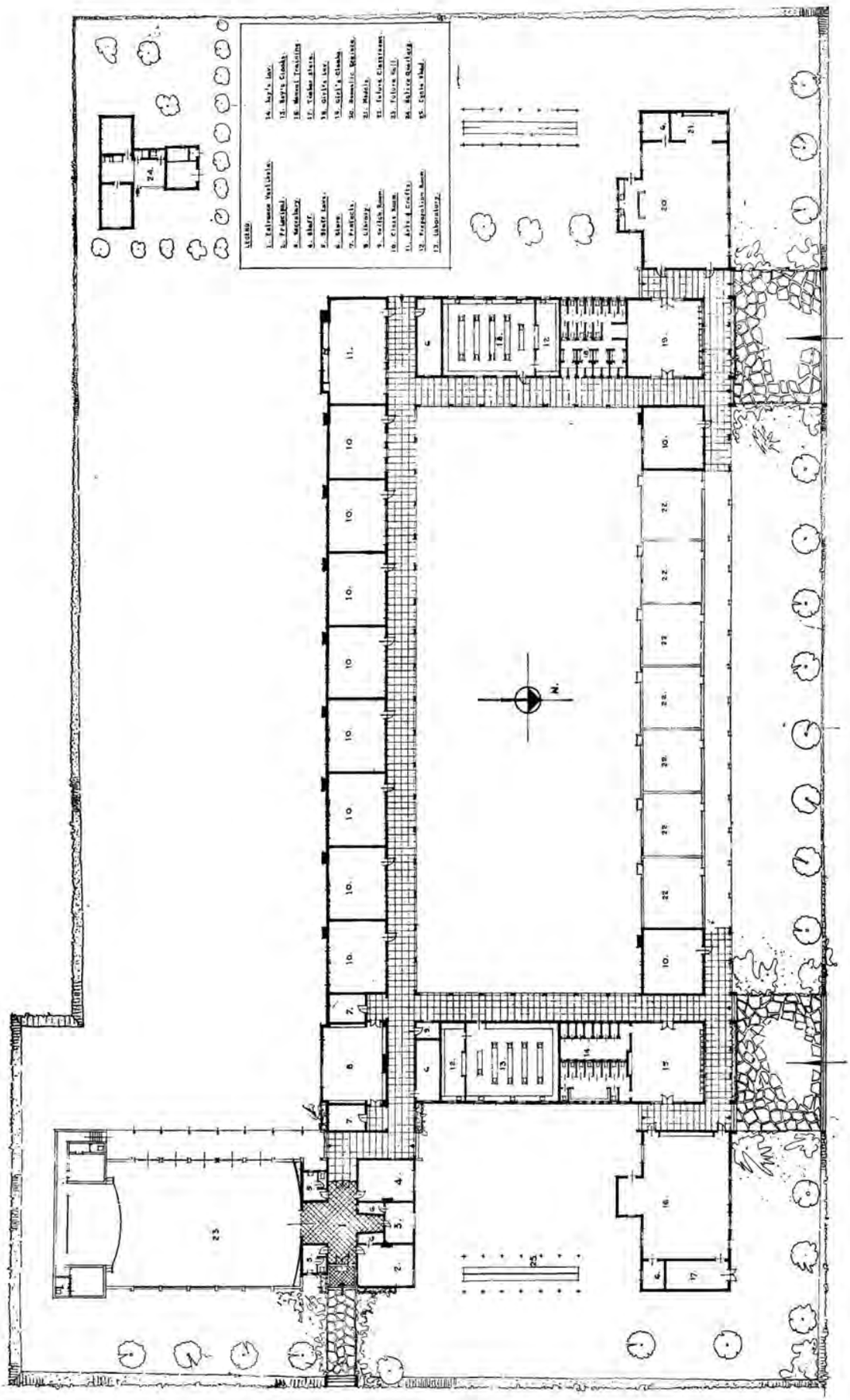
PROPRIETORS: PUBLIC SERVICES PUBLICITY (PROPRIETARY) LIMITED.
EDITORIAL OFFICES AND PUBLICITY DEPARTMENT: FIRST FLOOR, 92, MAIN STREET, JOHANNESBURG TELEPHONES 33-9606, 33-1505.
LONDON ADDRESS: RYTON PUBLICITY SERVICES, 92, FLEET STREET, LONDON E.C.4.

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 South Africa and activities overseas.

VOLUME X • NUMBER SIXTY-THREE • FEBRUARY 1949

CONTENTS



Plan: Erasmus Junior High School, Bronkhorstspruit.

ERASMUS JUNIOR HIGH SCHOOL BRONKHORSTSPRUIT

THE site of this school is on the western side of the town and south of the National road from Pretoria to Bronkhorstspruit. The area of land available was 19 morgen, on which the Provincial Administration had set aside space for a Girls' Hostel, a small Isolation Ward Unit and a Principal's residence (all of which were erected approximately five years ago), the New Junior High School and a Boys' Hostel (still to be built).

These were grouped so that the Girls' Hostel, Principal's Residence, Isolation Ward and future Boys' Hostel are, or will be, on high ground and on the southern portion of the site, with the New Junior High School on the lower ground on the centre axis.

To adhere to the lay-out already determined, the new School site became one of concern for, on examination of the soil, it was found to consist of sandy loam, oudklip, pot clay and clay in proportions approximately as follows :—

1. Sandy loam ..... 18″ to 2′6″ deep.
2. Oudklip ..... 18″ to 2′0″ „
3. Pot Clay ..... varying from 4′0″ to 6′0″ „
4. Clay.

The majority of buildings in Bronkhorstspruit have either been built on or in the sandy loam, or else their foundations have been excavated to the oudklip level. Neither of these methods has been successful. Therefore, under these circumstances, it was considered that, in order to obtain a uniform condition for the foundation of the new building, it would be advisable to place the footing of the foundation at water table level in the clay. By the adoption of this method an inverted reinforced steel concrete T beam was used, with columns spaced at intervals and rising from this beam a plinth beam under all walls in varying depths from 7′6″ to 15′0″ as shown on the diagram overleaf. Owing to the length of the building, it was considered necessary to provide expansion joints through the plinth beams, brickwork, roofs and paving at various positions, i.e. between classrooms and the junctions of corridors.

Side entrances and Library window.

Entrace vestibule and Principal's office.

The school is a single storey planned in two parallel blocks ; one on the south side and the other on the north, linked by eastern and western blocks — thus forming a large courtyard, when the future classrooms are added. The south block comprises eight classrooms, an Art room, Prefects' room, Library and the Administration block ; while the north block includes the Domestic Science and Manual Training centres, together with cloakrooms for boys and girls, as well as classrooms with space for future extension between these rooms. The links that form the courtyard comprise two Laboratories with interleading preparation rooms, Art store, stock room and the lavatory, etc.

The Administration block is planned as a separate block and connected by a passage to the main body of the school. This arrangement allows for the main entrance to the school and future entrance to the Hall by forming a vestibule between these units.

The Domestic Science and Manual Training Centre : These units have been planned at the end of the north block and a lobby has been provided as a cut-off from the main body of the school, which is also used by visiting pupils, with the cloakroom and lavatories conveniently situated.

The Library has been placed on an axis of the eastern link in the southern block, with the Prefects' rooms on either side as buffers between the classrooms and with lobbies to the entrance of the Library itself. This room has been equipped with the necessary bookcases and an attractive stone-surround fireplace.

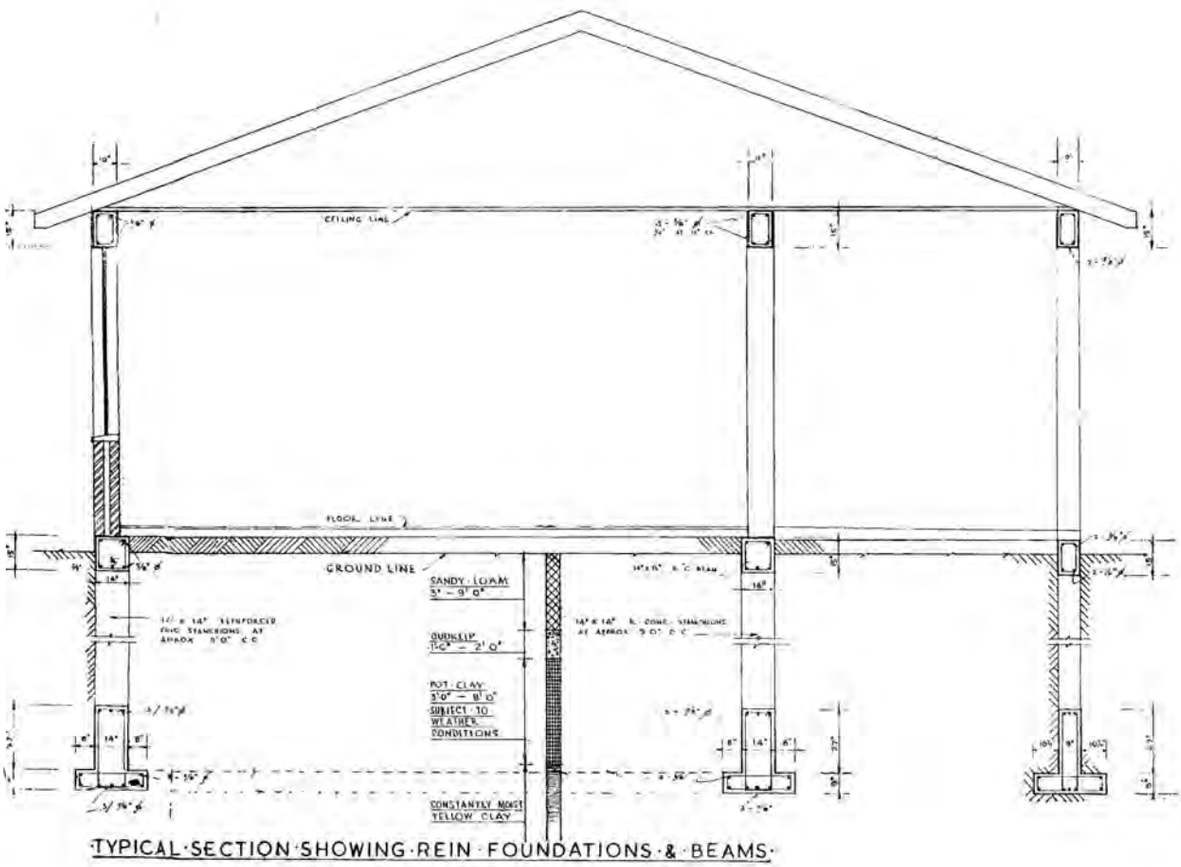
The Classrooms: All classrooms have a southern aspect with open corridors on the north. These classrooms are finished in the standard design of provincial schools with light brown coloured brick dadoes, distempered walls above completed with slate blackboards, pinning board, cupboards and coal slow-combustion fireplaces.

The Laboratories are of standard pattern, equipped with the necessary worktables, wall benches, fume cupboard, etc.

Externally the building is finished with Kirkness Vertex $2\frac{5}{8}$" brindle facing bricks, with the plastered coloured plinth of stone colour and texture, while the concrete band over window-doors is plaster and lime-whitened white.

Owing to the nature of the ground the courtyard or quadrangle is paved with tarmacium laid to fall and drain from the site.

The Erasmus Junior High School was designed by Aubrey V. Nunn, of Pretoria. A. R. Robertson, of Pretoria, was the consulting engineer, whose services were called upon by the Administration for advice regarding the foundations.



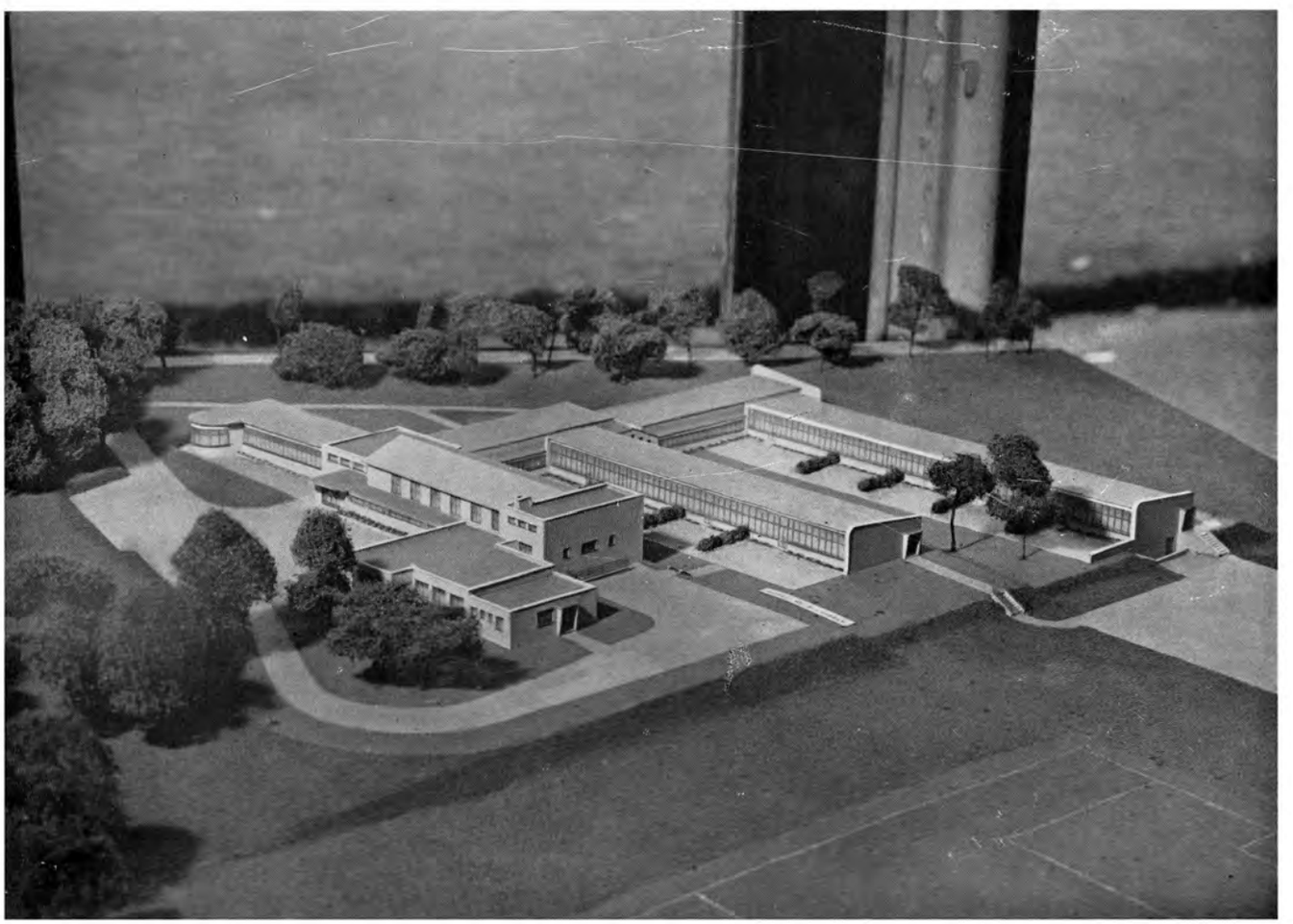
TYPICAL SECTION SHOWING REIN FOUNDATIONS & BEAMS

View from the south-west showing Domestic Science block on the left and girls' lavatories, preparation room and laboratory on the right.

Vista along the colonnade on eastern side of main courtyard. A preparation room, laboratory, boys' lavatory, and cloakroom are to the right.

The south aspect. At the left is the Arts and Crafts centre, with the classrooms extending along to the right. Heating is by single-flue slow combustion stoves.

SCHOOLS OF TO-MORROW ?



An exhibition of "Schools Tomorrow" has recently been held in Kent, England. Included are exhibits, relating to new schools, lent by the Royal Institute of British Architects. The exhibition illustrated progress in school architecture, throughout the years, the present trend of design of school buildings and the technical considerations which influence particular types of construction. The model depicted above is that of the Sevenoaks Wildernesse County Primary School.

THE RAND WATER BOARD

FORTY-FIVE YEARS OF PROGRESS

The recent issue of the 43rd Annual Report of the Rand Water Board enables a survey to be made of the facilities, service and performance of this public body which has now been in existence for close on half a century. The Editor is indebted to the South African Institution of Engineers for permission to utilise information from the Presidential address of Mr. J. P. Leslie, Chief Engineer to the Rand Water Board, given in 1946 and relating to its early history.

THE Board was constituted in 1903 to supply water in bulk to its constituent authorities consisting of the Local Authorities and the Transvaal Chamber of Mines. In 1914 the South African Railway Administration also became a constituent authority. The Local Authorities at the present time are the Municipalities of Johannesburg, Krugersdorp, Germiston, Boksburg, Roodepoort-Maraisburg, Springs, Benoni, Brakpan, Randfontein, Nigel, Pretoria and Vereeniging. Water is also supplied in bulk to several small town and village councils and health committees; to the larger industrial organisations, and to a few small industries, as well as sundry small consumers which are outside the areas of the constituent Local Authorities. Non-potable raw water is also purchased from the Board by a number of industries in the Vereeniging area.

Early History

Sponsored by Lord Milner the Board took over, on 31st March, 1905, the water undertakings of the Johannesburg Waterworks Estate and Exploration Company, Limited, the Vierfontein Syndicate, Ltd., and the Braamfontein Company, Ltd. The total water supply of these three concerns was only about 2½ million gallons a day or a little over a fortieth part of the Board's daily capacity at the present time. For the almost valueless assets of its predecessors the Board was compelled, under the Ordinance of 1904, to pay £3 million — a crippling capital expenditure for the infant concern. At the same time the Board was only permitted to sell water in bulk to municipalities and consequently had, and still has, no control over internal reticulation in municipal areas nor over the retail price of water.

The Board's principal source of supply is the Vaal River, which reaches its most northerly point at Vereeniging, about 1,000 feet below Johannesburg. The Vaal River reservoir, which has a catchment area of 18,000 square miles, was created by the construction of a Barrage about 23 miles below Vereeniging. This Barrage consists of 36 sluice gates which are adjusted to keep the level of the water at a depth of 24 feet, and was opened in 1923 by H.R.H. Prince Arthur of Connaught, then Governor-General of the Union. During high floods these gates are lifted above the high-water level so as to give unrestricted flow in the Vaal River.

Up till 1923, wells and boreholes at Zuurbekom and Swartkopjes, respectively, were the Board's principal sources of supply. At that time, a quarter of a century ago, the daily consumption of water on the Witwatersrand had risen to 12 million gallons, less than a seventh of the Board's present plant capacity. But in 1929 and 1933, and again in the succeeding year, extensions had to be made to the Vaal River scheme in order to meet the growing demand. These extensions exhausted the reserves of raw water and consequently, the Vaaldam was constructed, about 50 miles upstream of the Barrage, in 1937, the expense being met partly by the Government and partly by the Rand Water Board. In this manner certain irrigation projects and an increased water supply to the Witwatersrand were jointly secured. Since the completion of Vaaldam, the flow of water in the Vaal River is controlled for the major part of the year.

Sedimentation and Pumping Plants

The water is abstracted from the Vaal River at two intake-stations situated approximately one mile and three miles, respectively, from the main station. The pumps deliver the raw water through pipelines into the sedimentation system at the main station.

This sedimentation system consists of primary mixing tanks, primary sedimentation tanks, secondary mixing and carbonation tanks, and secondary sedimentation tanks, the total mean time of retention being about 17 hours. After clarification, the water passes through a system of 82 rapid gravity filters. The filtered water is collected and chlorinated in underground, clear-water, covered reservoirs and, except for a small percentage, is not again exposed directly to the atmosphere.

The water is drawn from these reservoirs and delivered by electrically-driven circulating pumps through condensers to the steam turbine-driven, centrifugal high-lift pumps which, in turn, deliver the water through a system of pipelines to Zwartkopjes Pumping Station approximately 27 miles from Vereeniging. Originally boreholes at Zwartkopjes were a principal source of the Board's supply but, owing to increasingly bad chemical and bacteriological qualities in the water so obtained, these boreholes were abandoned in 1945.

The water received at Zwartkopjes from Vereeniging is now re-pumped by means of steam turbine-driven centrifugal pumps into the Forest Hill reservoirs and the Yeoville reservoirs (Johannesburg Municipality) on the Central Rand, and into the Brakpan and Benoni reservoirs situated on the East Rand.

Potable water is also pumped from a series of boreholes in wells at Zuurbekom (about 17 miles to the south-west of Johannesburg), and is used to augment the Vaal River supply

on the West Rand. This water is raised from the wells by means of electric motor-driven pumps and delivered to the main station. From there it is re-pumped by electric motor-driven centrifugal pumps into the Krugersdorp and Roodepoort reservoirs on the West Rand and into the Libanon reservoir on the Far West Rand. The electric power required at Zuurbekom is generated at Zwartkopjes and transmitted by a 16.5 kV overhead line, approximately 17 miles in length.

A small stand-by pumping station at Paarlshoop boosts the water from Forest Hill reservoir into Roodepoort and Krugersdorp reservoirs. There is also a small, emergency motor-driven centrifugal pump maintained at the Village depot to boost Forest Hill water into Yeoville and Signal Hill reservoirs when required.

There is, probably, no water undertaking of equal size which has to rely so entirely upon pumping plant to maintain a continuous supply of potable water. As the difference in level between the Vaal River Barrage and the Yeoville reservoir is 1,300 feet, a total pumping head of nearly 2,000 feet is necessary to obtain a satisfactory hydraulic gradient. Nor is that all. The pipeline distance between these two points is 40 miles, which makes direct pumping uneconomical. Consequently, more than 90 per cent. of the water delivered to the Witwatersrand has to pass in series through four sets of pumps, about 10 per cent. through five sets and about 5 per cent. of the whole passes through six pumping systems. To secure a continuous supply of water a total of 150,000 b.h.p. capacity pumping plant has been installed.

Interior of the Forest Hill Reservoir, completed in March, 1946. With an internal diameter of 395 feet, the capacity is 25 million gallons.

Limits of Supply

The key plan, shown on page 25, indicates the Limits of Supply, the areas of the constituent Local Authorities and the principal features of the Board's system: cross sections between the Vaal River and Pretoria and along the Witwatersrand from west to east show the relative levels of the service reservoirs, and the manometric heads imposed by the pumping system.

The limits of supply cover the area of 3,980 square miles within which the Board is empowered by statute to supply water. The estimated total population within these limits is 2,102,000, and that within the municipal areas of the constituent Local Authorities is 1,639,000. The total area of the Local Authorities is 621 square miles; the population within this area (with the exception of Pretoria, 200,600) takes its water for domestic purposes almost entirely from the Board.

The Board's total abstraction rights amount to 225 million gallons per day, made up of 215 million gallons per day from the Vaal River, and 10 million gallons per day from underground sources in the Klip River Valley. The rights to abstract 29.025 million gallons per day of raw water from the Vaal River have been disposed of to industrial users near Vereeniging, leaving a net quantity of 195.975 million gallons per day available to the Board.

The capacity of the pumping plant, purification system and pipelines is 90 million gallons per day under normal load conditions; peak loads of short duration in excess of this figure can be met by drawing on the storage capacity of the service reservoirs and by working under overload conditions.

Water Supplied

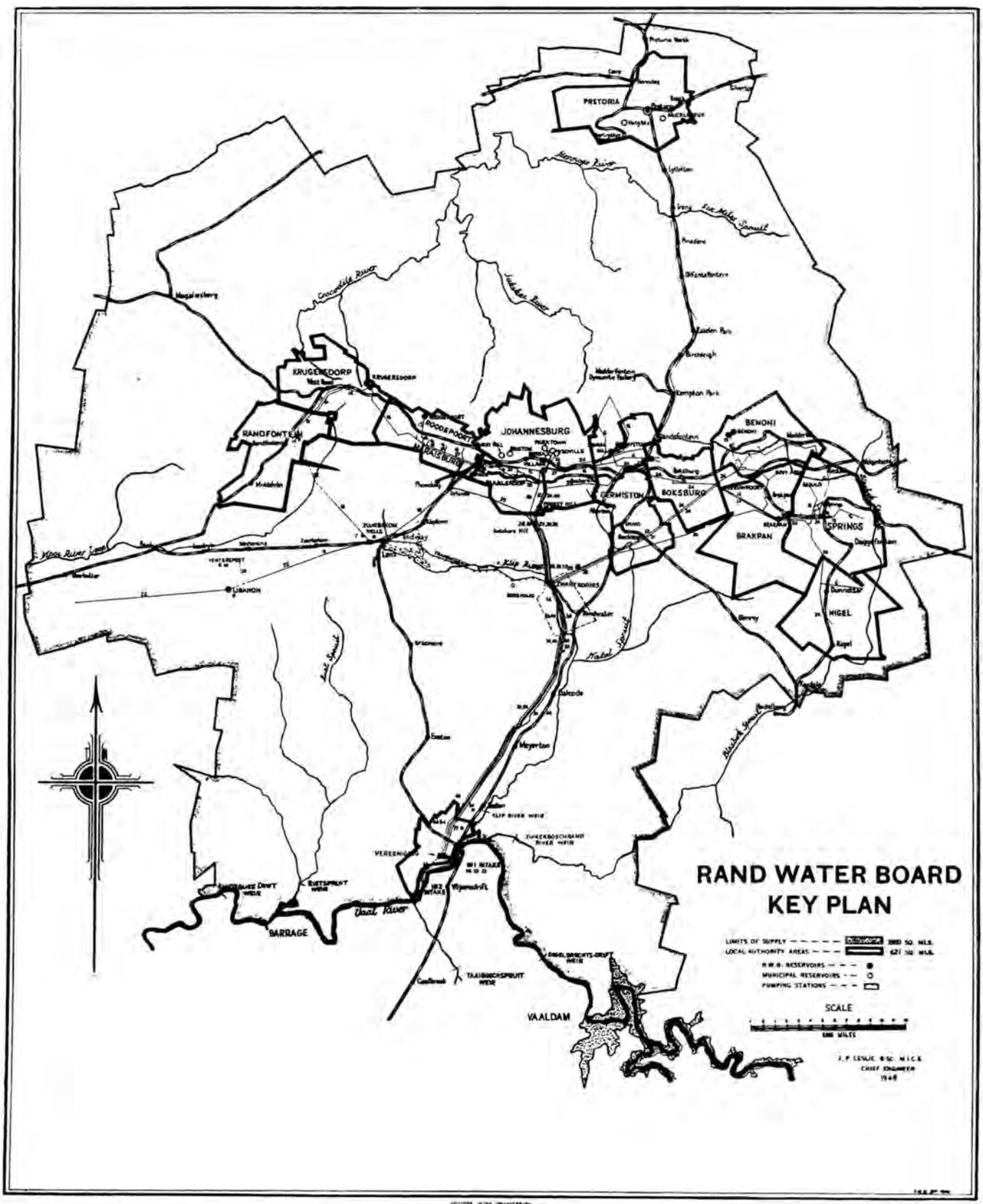
The total quantity of water raised by the Board from all sources during the year ended on March 31st, 1948, was 31,116.299 million gallons or a daily average of 85.017 million gallons. Of this total, 92.09 per cent. was obtained from the Vaal River, and the balance, 7.91 per cent., from the Zuurbekom wells. After allowing for the water used in the purification process at Vereeniging, 29,394.736 million gallons of potable water was obtained, or a daily average of 80.313 million gallons.

In addition to the water raised by the Board during the same period, 4,561 million gallons of non-potable water or an average of 12.461 million gallons per day was abstracted by authorised users from the Vaal River.

The water lost by leakage, overflow from reservoirs, and errors in metering was 794.748 million gallons, or 2.704 per cent. of the potable water produced.

The total quantity of potable water supplied during the year was 28,390 million gallons, or a daily average of 77.568 million gallons. The maximum supplied on one day was 103.485 million gallons on the 19th November, and the minimum was 60.389 million gallons on the 3rd April. The daily average for the maximum month was 89.213 million gallons in November, and for the minimum month was 68.054 million gallons in April. The discharge for the twelve monthly period ending 31st March, 1948, was 192, 967 million gallons. Owing to storage in Vaaldam, the maximum flows at the Barrage do not represent the peak floods of the Vaal River.

The rainfall recorded at the Barrage for the hydrographic year was 26.85 inches compared with an average of 26.20



The Area of Supply of the Rand Water Board.

inches for the last 30 years. The maximum daily evaporation for the year was 0.37 inch on the 1st and 25th of January and a minimum of 0.01 inch on the 27th of April.

Purity and Hardness

During the year 468 samples of water from various points in the catchment area of the Vaal River were examined in the Board's laboratories. Chemical and physical routine control tests on the water undergoing purification numbered more than 10,000, while the bacteriological quality of 2,170 samples were determined. In addition the South African Institute of Medical Research examined 630 samples bacteriologically and the Government Chemical Laboratory analysed 173 samples chemically.

Bacteriologically the raw Vaal River water does not, up to the present, show abnormal pollution. The number of hot-growing organisms present in one millilitre varies from about 200 to 4 or 5 thousand, and coliform bacilli are only occasionally found in so little as a tenth of a millilitre of the river water.

The Vaal River water, as discharged from the Vaaldam, has a normal hardness of 6-7 parts per 100,000, is moderately soft and is eminently suited for a domestic supply. Tests over a number of days, during the years 1942 to 1945 inclusive, showed that on 50 per cent. of the days the hardness did not exceed 8; and 80 per cent. of the days it was less than 10; on 96 per cent. of the days it was under 15 and only on 4 per cent. of the days was it more than 15 parts of calcium carbonate per 100,000.

The total quantity of water drawn from the Vaal River for purification was 28,654 million gallons which yielded 26,933 million gallons of purified water. The smallest quantity abstracted from the river on any one day was 50.8 million gallons on June 15th, 1947; the largest quantity 101.2 million gallons on November 1st. The daily quantity abstracted from the river exceeded 90 million gallons on 52 days.

The discharge from the Vaaldam was controlled until the dam overflowed on March 30th, 1948.

Storage and Pumping Costs

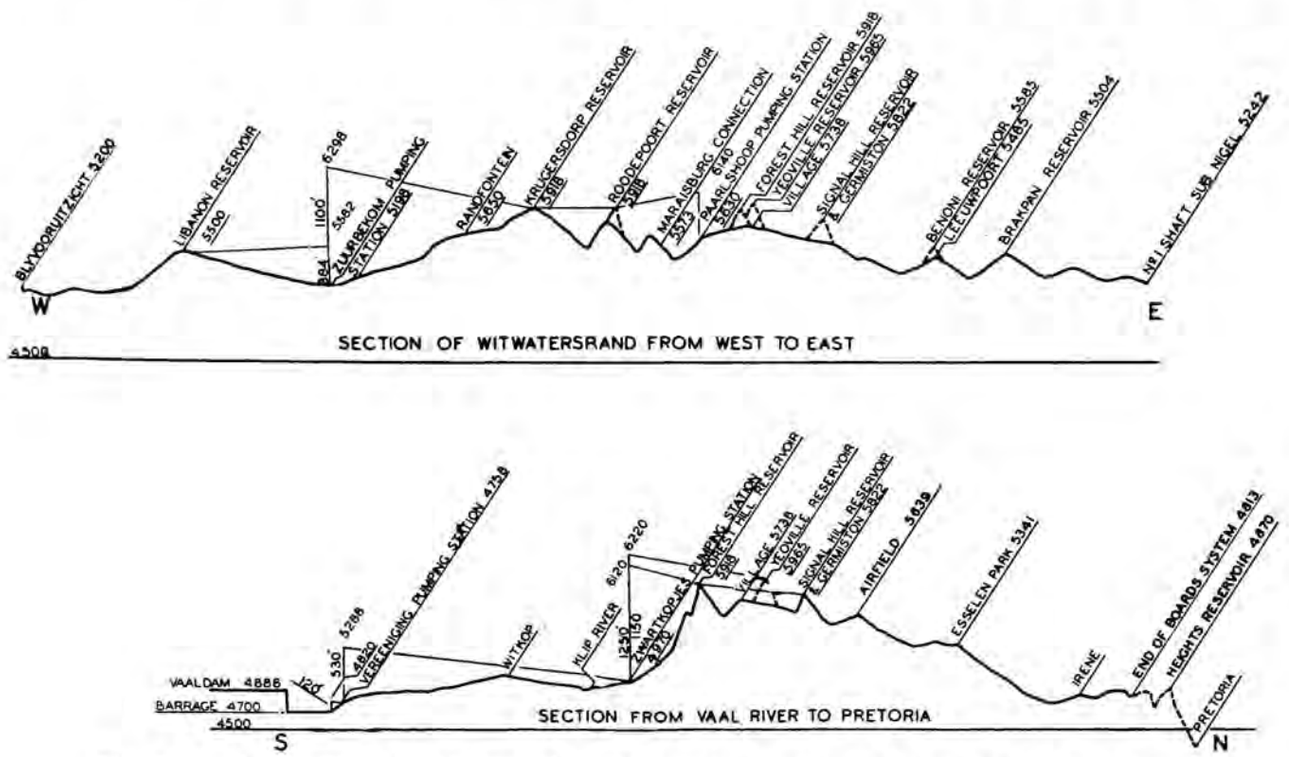
Raw water is stored in the Vaal River above the Barrage and in the Government-owned Vaaldam. Potable water used for balancing purposes is stored in uncovered reservoirs at the Vereeniging and Zwartkopjes pumping stations. Covered service reservoirs used for distribution and elimination of peak load conditions are located at high points along the Witwatersrand. The total capacity of the service reservoirs is 114.353 million gallons.

The total unit cost of pumping 1,000 gallons into supply was 1.5103 pence as compared with 1.4969 pence last year, while the average unit cost for all stations of raising 1,000 gallons 100 feet was 0.0995 penny as compared with 0.0992 penny last year.

The total footage of pipelines in service excluding pipes less than 6 in. diameter is 478 miles. All the water raised and supplied is metered. Meters are installed on the intake pipelines, on the delivery mains from all pumping stations at control points, and immediately before delivery to all consumers. The total number of meters installed is about 690.

Additional Water Supply (1941) Scheme

The Additional Water Supply (1941) Scheme provided for an additional 20 million gallons per day, increasing the total available to 90 million gallons per day. The scheme was delayed by the war, but in December, 1946, sufficient of the essential work had been completed to permit an output of 80 million gallons per day without operating on overload conditions. The completion of the additional pumping plant at Vereeniging and Zwartkopjes pumping stations permitted the



The effects of comparative heights upon the water pumping problems of the Rand Water Board.

The Vereeniging Pumping Plant.

total water available for distribution to be increased to 90 million gallons per day as from the 1st November, 1947. The scheme was estimated to cost £2,347,000 and as at the 31st March, 1948, had cost £2,039,960.

Supply of Water to Pretoria

The agreement between the Board and the Pretoria City Council dated September, 1943, provided for the supply of potable water to Pretoria by the installation of a 10 million gallon per day capacity pipeline. The estimated cost of this pipeline was £560,000 of which amount the Board agreed to contribute £280,000.

It was not possible to proceed with the scheme during the war, but contracts for the supply of 50,000 feet of imported pipe and 132,000 feet of locally made pipe were awarded in September, 1945. It was estimated that the complete delivery of the pipes would be effected by August, 1947, and that the installation would be completed by September, 1947, but accelerated deliveries of the pipe manufactured locally permitted the completion of the pipeline by the 30th May, 1947, from which date it was possible to commence to supply water to Pretoria.

Additional Water Supply (1946) Scheme

The Additional Water Supply (1946) Scheme, designed to increase the potable water available by 20 million gallons making a total of 110 million gallons per day, was approved by the Board in June, 1946, at an estimated cost of £1,793,000. Details of the scheme were given in last year's annual report. The estimate has now been increased to £1,811,000 to provide for two coupling transformers. As at the 31st March, 1948, all of the contracts for the supply of essential plant and pipes had been awarded in a total of over £1,000,000 and work was proceeding on the construction of the filter tanks and sedimentation tanks and the installation of Zwartkopjes-Yeoville and Zwartkopjes-Forest Hill pipelines. Some of the treatment plant and pipelines will be available for service before the end of 1948 but, due to the times of deliveries quoted, the installation of pumps and boilers will not be completed until 1951, although a portion of the additional water will be made available before that date.

Additional Supply From The Vaal River

To provide for the future expansion of the undertaking, a site for a new purification works 400 acres in extent has been purchased on the Vaal River a few miles above the confluence of the Zuikerboschrand tributary. The route of the pipeline between this site and the site of the new reservoir to be built at Daleside has been surveyed and fixed. The treatment of the water, which differs in chemical composition as compared with that abstracted at Vereeniging, is being investigated to determine the most suitable and economical purification process and the design of the purification works.

Future Consumption

In his Presidential address, two years ago, to the South African Institution of Engineers, Mr. Leslie, the Chief Engineer, pointed to a satisfactory drop in the price of potable water to consumers, from five shillings per 1,000 gallons in 1903 to about 10d. per 1,000 gallons in 1946. At the same time he drew attention to the facts that there are definite limits to the quantity of water that can be abstracted from the Vaal River and that there is no other nearby source of supply of any magnitude.

Flow records from the Vaal at Vereeniging covering the period 1900-1946, show that there is sufficient water to provide only 250 million gallons daily. At the present consumption rate of 60 gallons per head per day the flow of the Vaal River

will support a population of about 4 million, or roughly double the present number living within the Board's area of supply. Consumers' advices of future water requirements indicate an annual increment of 5 million gallons per day. On this basis the total yearly average may reach 115 million gallons per day by 1955. Assuming only 50 million gallons per day of non-potable water for industrial users abutting the Vaal River, the capacity above Vereeniging will be wholly absorbed by 1975 *if the present rate of expansion is maintained* (our italics).

This estimate, be it noted, was made in 1946 *before* the present plans for the new O.F.S. Goldfield or for the proposed oil-from-coal plant were clearly formulated. In the light of these fresh developments, Mr. Leslie might himself wish to revise his estimate and draw the day, when maximum draw-off and capacity assumption equalise themselves, several years closer.

As he remarked in the concluding paragraphs of his paper "The supply of water is the controlling factor in the future economic development of the country. The low total rainfall, the uneven distribution over the year, the occurrence of droughts, the extreme variation in the rate of precipitation, the high rate of evaporation and the absence of suitable storage sites present a problem that will not easily be solved.

"The sooner we realise that our South African cornucopia holds little water, the sooner we shall take steps to conserve, to protect and to use to the best advantage and without waste, the little we have of this most precious gift of the gods."

●

SOUTH AFRICAN BUREAU OF STANDARDS

JUSTIFICATION FOR MODEL BUILDING REGULATIONS AND CODES OF PRACTICE

IT is clear that there is not only some difference of opinion but also a certain amount of misunderstanding about the "Model Building Regulations and Codes of Practice" proposed for the Union. The Pietermaritzburg conference of the Institute of Municipal Engineers, held in August, 1948, was critical of the work being done by the S.A. Bureau of Standards in this direction.

This article, reprinted from the "South African Standards Bulletin," sets out the reply of the Bureau to the criticisms made at Pietermaritzburg. In the last few months an investigating committee has been engaged upon re-examining the position in the light of the criticisms put forward. This has resulted in 5 recommendations, generally advising the continuance of the work and also the issue of a questionnaire to all municipalities.

As the Bureau of Standards point out in their article, "South Africa is a young country and, in her best interests, should benefit by the experience of other countries, such as Canada and the United States, which have found it wise to adopt national and state building regulations and codes of practice."

THE Co-ordinating Committee, appointed by the Standards Council in connection with the drafting of model building regulations and codes of practice for voluntary adoption, has been asked by the Institution of Municipal Engineers to justify the need for preparation.

Critical Views

The request is implicit in a resolution passed at the Institution's conference at Pietermaritzburg in August and drafted after a critical report of the committee's work had been read by Mr. S. S. Morris, Building Surveyor in the Cape Town City Engineer's Department, and the Institution's representative on the committee.

The report, the writer admits, was based on four documents — the minutes of the Committee's first two meetings, which took place before he became a member, and on two draft regulations prepared by committees of the Institution of Structural Engineers before the Standards Council took over the task of preparing model regulations.

The Committee finds it somewhat difficult to understand why it should have been called on to justify the need for model regulations at this stage, particularly since the introduction of the report presented at Pietermaritzburg stated :—

"There is no objection to the principle of having model regulations framed by a central body for the guidance of municipalities in the framing of their own regulations. On the contrary, there is much to recommend the step, for under such an arrangement each municipality would be at liberty to extract from the model clauses such portions as were required, and vary and rearrange them in such a manner as local conditions and circumstances might dictate."

It is possible, however, that Cape Town's Building Surveyor, who was concerned in the drafting of the resolution at Pietermaritzburg, changed his views in deference to his chief, the Cape Town Engineer, who, in the discussion which followed the presentation of the report, said he felt that the time was premature for the production of model regulations and codes and that each town should revise their present regulations if there were the necessity. Cape Town, he added, was itself now preparing a new set of regulations.

Other delegates at the conference, however, did not agree with the Cape Town Engineer. The Town Engineer of Paarl said the smaller towns especially would welcome the production of a model set of regulations, while Pretoria's City Engineer pointed out that very few city engineers had the time or staff to revise their own regulations.

Similar support for the Committee's work was given by the City Engineers of Johannesburg and Port Elizabeth, a representative of Kroonstad Municipality, the Chief Engineer

of Vanderbijl Park, and by a representative of the National Building Research Institute.

A further justification for the drawing up of model regulations — in itself, in the Committee's opinion, a sufficient justification for its work — is to be found in the report presented at Pietermaritzburg.

Shortage of Technicians

To emphasize the difficulty of administering regulations and codes of practice, the writer instanced the extreme shortage of technical men and pointed out that of the 214 municipalities in the Union more than 175 were without qualified architects or engineers on their staffs.

In these circumstances it is obviously of the greatest importance that model regulations should be made available to municipalities, which lack the services of men capable of giving them authoratative advice on all aspects of building.

In several places the report supported the need for unifying, where possible, the existing regulations.

The Committee would point out that it was this need which prompted the revision of building regulations in the Transvaal, in particular the Rand, where the most rapid development and expansion in the Union's history has been taking place.

Individual Attempts

In the past two or three decades attempts have been made by various municipalities to re-write their building regulations, but only a few of these attempts have reached the stage of publication, the most notable of these being the Reef Uniform Building By-laws, adopted by 15 of the larger municipalities some seven or eight years ago. This was a commendable piece of work but not without its weaknesses.

It was apparently these weaknesses that prompted the Institution of Structural Engineers (Union of South Africa Branch) to appoint in 1945 a "Committee on Recommended Building Regulations" to draw up "type by-laws for structural work as a guide to public bodies." Municipalities and other interested organizations were invited to participate in this project and work proceeded.

By September, 1946, it had become apparent that this task was of so vast a nature that a purely voluntary organization could not cope with it. In view of the fact that the South African Bureau of Standards had by then been established by the Standards Council, it was unanimously decided that the Committee be taken over by the Bureau. The sub-committees as already organized, continued their functions, the Bureau carrying out all the secretarial and clerical work and also contributing with technical assistance.

Co-ordination Essential

Towards the end of 1947 it was felt that the scope of the committees should be expanded to take in the aspects of architecture and installation. The Co-ordinating Committee was, therefore, established, having under its control three main committees with attendant sub-committees, the task of the latter being to prepare a model set of building regulations and codes of practice on structural, architectural and installation aspects.

Among organizations invited to membership were the Institution of Municipal Engineers, the Institution of Civil Engineers, the Transvaal Association of City and Town Engineers, the Department of Public Works, the South African Railways Administration, the Rand Water Board, the Electricity Supply Commission and the National Building Research Institute.

To gain even greater expression of views and assistance from municipal authorities, the Bureau later invited the Engineers of the Union's nine largest cities to become corresponding members; only Cape Town's City Engineer declined.

Antiquated By-laws

Yet another reason why the Committee feels that model regulations are necessary, lies in the many anomalies to be found in existing by-laws and in the unnecessary differences in them as between municipality and municipality throughout the Union; in many cases they are so loosely phrased or so antiquated that they cannot be put into operation.

Space does not permit the citing of examples from every city and town in the Union, but investigation has revealed

THE CO-ORDINATING COMMITTEE

Dr. F. J. de Villiers	Chairman of the Standards Council and Industrial Adviser, Department of Commerce and Industries.
Mr. C. L. F. Borckenhagen	Controller of Building Material.
Colonel G. A. Clark	Consulting Engineer, Johannesburg, and representing the Institution of Structural Engineers.
Mr. E. W. Dohse	Chief Engineer, the Department of Public Works.
Professor J. Fassler	Professor of Architecture, University of the Witwatersrand, and representing the Institute of South African Architects.
Mr. J. E. Jennings	Director, National Building Research Institute.
(alternate Mr. C. A. Rigby)	Senior Research Officer, National Building Research Institute.
Mr. R. W. Kane	Electrical Department, Johannesburg Municipality, and representing the South African Institute of Electrical Engineers.
Dr. F. E. Kanthack	Consulting Engineer, Johannesburg, and a former Director of Irrigation.
Mr. C. P. Lange	Consulting Engineer, Johannesburg.
Mr. S. S. Morris	Building Surveyor, Cape Town City Engineer's Department, and representing the Institution of Municipal Engineers.
(alternate Mr. A. Archibald)	Town Engineer, Springs.
Mr. J. Ritchie	Director, South African Bureau of Standards.
Mr. H. Schrader	City Engineer, Johannesburg.
Professor W. G. Sutton	Dean of the Faculty of Engineering, University of the Witwatersrand.
Mr. J. W. Swardt	Principal Technical Officer, Engineering Division, South African Bureau of Standards.
Mr. L. de Vaal	City Engineer, Pretoria.

the general situation throughout the country to be very much the same as that now existing in Cape Town, from the regulations of which the following will doubtless be of interest :—

One Cape Town building regulation states "every room set apart for the purpose of a kitchen shall have a properly constructed fireplace built into the wall of the building." In a day and age when electric and gas stoves have long superseded the coal range, it is a by-law which has long been obsolete.

The same city has a regulation which states that every habitable room on a ground floor shall be at least ten feet and on the first floor at least nine feet six inches in height. It says nothing, however, about the height of rooms on the second and subsequent floors, an important point in the case of a block of flats. In any case these minimum height requirements for ground and first floor rooms are greater than those of any other city or town in the Union.

A third example from Cape Town's regulations is one requiring all roofs to have gutters. Yet in the city's suburbs a great number of houses have thatched roofs, which, by their very nature, are gutterless.

A further regulation, as worded, expresses the exact opposite of what was obviously intended for it would prevent a four-inch drain from being laid at a *steeper* gradient than 1 in 40, whereas it was obviously the intention of the drafter to prohibit such a drain from being laid at a gradient *flatter* than 1 in 40.

Regarding variations in permissible space for buildings on plots in different localities of the city, the first category of localities is described as "important residential districts." What constitutes an "important residential district" is not defined and it is obviously a regulation which could be successfully challenged at law.

Which is Right ?

When designing a reinforced concrete building for Cape Town, an architect must instruct his structural engineer to work on a design basis of 16,000 pounds per square inch permissible working maximum tensile stress for his steel reinforcing. Should the building be intended for Johannesburg, however, a design stress of 18,000 pounds is allowed, resulting in an approximate saving of 12 per cent. steel compared with a similar building in Cape Town.

Both the Reef By-laws and Cape Town Regulations permit a reduction in superimposed loading for the purpose of calculating the total load carried on foundations, pillars, walls, etc.

It will be seen from the following comparison that there is a larger reduction in superimposed loads permissible in the Reef By-laws than in the Cape Town Regulations :—

Description of storey.	Reef By-laws Per cent. Reduction of its Superimposed Load.	Cape Town Regulations Per. cent Reduction of its Superimposed Load.
Next storey below topmost storey	10	5
Next storey below	20	10
Next storey below	30	15
Next storey below	40	20
Next storey below	50	25
Next storey below	50	30
Next storey below	50	35
Next storey below	50	40
Each succeeding storey	50	50

The height of buildings is a further matter of difference. No Cape Town building, other than Government structures, may exceed 120 feet. In Johannesburg, provided that the width of the street be sufficient and that adjoining owners do not object, the regulations permit buildings of 140 feet (or even higher if the cubic content be the same as that allowed for a 140-foot building).

The two cities do not even agree on drainage, Johannesburg plumbers may install a two-and-a-half gallon lavatory flushing cistern, but in Cape Town a plumber would ". . . on conviction be guilty of an offence and liable, etc . . ." if the cistern had a capacity of fewer than three gallons.

The standard of public building ventilation in Johannesburg is defined by a Kata-thermometer figure, but in Cape Town this ventilation must be such as to "cause a slow and imperceptible movement of the atmosphere without causing of draughts," a phrase of purely academic interest and valueless from a technical viewpoint in its very vagueness.

Architects' Difficulties

The existing difference between by-laws and regulations of cities and towns is the South African architect's most difficult problem, especially in the case of an architect with a Union-wide practice.

Should, for instance, he be asked to design a building for a country town, he must first secure a set of the local building regulations. All too frequently he is informed that these are out of print, but "may be inspected at the office of the town engineer." This entails a journey to the town to discover the points on which the local regulations differ from those with which he is conversant. If he fails to notice some obscure clause, as he may do, his oversight may result later in a considerable loss of money and time. To make his task even more difficult, many of the clauses in the local regulations may contain the somewhat unsatisfactory and indefinite phrase ". . . shall be to the satisfaction of the town engineer . . ."

A further argument in favour of model regulations is the fact that South Africa is a young and rapidly expanding country and, in her best interests, should benefit by the experience of other countries, such as Canada and the United States, which have found it wise to adopt national and state building regulations and codes of practice. These regulations and codes were produced not by local officials with perhaps very limited experience, but by bodies of men of the greatest technical knowledge, men who were able to approach each problem from the national as well as the local viewpoint.

A Lengthy Task

The Pietermaritzburg report referred to the vast undertaking of committees working on this project of model building regulations.

It is indeed a large undertaking consisting of a total of more than 160 committee members selected from South Africa's most able and experienced men.

It has never been suggested that the work so far produced by the committees must be accepted as final. As is the practice in the preparation of all codes and specifications by the Bureau of Standards, the draft documents are first circulated to all interested bodies for criticism and comment so that the committees will know that, in the final result, the final draft is fully acceptable generally, due regard having been taken of the criticism and comments.

No Compulsion

Most speakers in the debate following the presentation of the report at Pietermaritzburg expressed the view that there

should be no compulsion on municipalities to adopt the model regulations.

This iterated emphasis on compulsion was due, it is felt, tc a misconceived note in the report, a large section of which was devoted to the writer's personal views of the effect of compulsory adoption of regulations and codes.

The Committee feels that had the writer been able to attend even one of its meetings between the time of his appointment to it and the presentation of his report, the unfortunate impression about compulsion would not have been created at the conference.

The Standards Council is aware that individually a number of members of the building committees feel that it would be most desirable for the model regulations and codes, when finally agreed, to be made compulsory throughout the Union, with provision for necessary adjustments to meet peculiar local conditions. In spite of this feeling, however, it must be stated that the Council, apart from its lack of legislative authority to bring about compulsion, has no intention of making any move to this end.

That part of Pietermaritzburg report dealing with compulsion and the writer's personal view of its possible effects and consequences can, therefore, be ignored, having been based on false premises.

Investigatory Committee

Inasmuch as the Co-ordinating Committee is always willing to receive, in fact welcomes, constructive criticism and suggestions and also because of the sweeping statements made in the report at Pietermaritzburg, it immediately appointed the following Investigatory Committee to examine all criticism :—

Mr. E. W. Dohsie (Chairman).
Prof. W. G. Sutton.
Prof. J. Fassler.
Col. G. A. Clark.
Mr. C. A. Rigby.
Mr. J. W. Swardt.
Mr. C. L. F. Borckenhagen (Corresponding member).
Mr. S. S. Morris (corresponding member).

Six meetings were held and Mr. Morris, as corresponding member, sent several communications and suggestions, which were given full consideration. After two months' intensive work, the committee has reported, its summarised conclusions being as follows :—

(1) The production of model building regulations is fully justified and where codes of practice could supplement regulations these should also be prepared.

(2) The present general set-up of committees is sound, except for minor changes of work distribution. The set-up of committees still to be formed under the original programme, however, should be considerably simplified to ensure that the ultimate results of their work form a uniform and coherent volume of model building regulations.

(3) There is no justification for drawing up a separate set of building regulations for empirically and scientifically designed buildings since the model set of regulations will be so framed as to cover both types. To separate the regulations into two such groups would only entail unnecessary work and expense.

(4) To ensure that the present model set of regulations do not inadvertently repeat any weaknesses found in present regulations, a questionnaire is to be circulated to all local authorities and other interested persons and organizations asking them to indicate weaknesses, deficiencies, and omissions in present regulations.

(5) Closer association should be established with all persons, organizations and local authorities so that
  (a) a better understanding may exist ;
  (b) the work of the Bureau should be better known and understood ;
  (c) closer co-operation can be established in achieving the objects of the model regulations.

The Investigatory committee's recommendations are already being put into effect and it is hoped thereby, that the work of preparing model building regulations and codes of practice for South Africa will be considerably accelerated.

Questionnaire Issued

The questionnaire below, which is being sent to all municipalities and also to all interested persons and organisations for additional information, is accompanied by a covering letter stating :

The objects of the model regulations are to

(a) modernize and bring up to date existing building regulations ;

(b) achieve uniformity in the general arrangement and requirements such as those relating to public health and public safety ; and

(c) provide a sound set of regulations to local authrities who have no regulations at present or whose regulations may be out of date.

Before embarking on the preparation of comprehensive details, the Bureau is anxious to

(a) ascertain what, if any, are the major weaknesses in existing building regulations, and

(b) gather information which will assist in determining the type, scope and contents of the proposed model regulations.

NEW ALUMINIUM BRIDGE AT SUNDERLAND.

Sunderland's aluminium alloy bridge, the first of its kind in the world, and which cost £85,000 to build. The bridge, which weighs only 54 tons, spans a 90-feet wide junction between two docks and will carry road and rail traffic.

THE QUESTIONNAIRE

1. Does your municipality/local authority possess any building regulations? .....
2. If so, can you supply a copy if requested? .....
3. By whom are your regulations, if any, administered? .....
4. (a) What is the designation of the person immediately responsible for the actual administration of your regulations? .....
   (b) What are his qualifications? .....
5. Do you consider that your existing Building Regulations require revision and modernization? .....
6. Please indicate specific provisions in your Building Regulations which
   (a) unnecessarily increase the cost of building .....
   (b) unnecessarily prolong the time taken to erect buildings .....
   (c) prevent the use of new materials and methods of sound building construction .....

.....

7. Are your building regulations deficient in respect of
   (a) omission of clauses on .....
   (give details of subjects for example, drainage, fire precautions, advertising)
   (b) incomplete clauses on .....
   (give details of subjects for example, foundations, structural concrete or steelwork)
   (c) any other way (give details) .....
8. (a) Have you any difficulty in regard to building developments in your area? .....

.....

9. Do you consider that it is necessary to have a waiver clause in your building regulations? .....

.....

10. Would you be prepared to give consideration to the adoption of a model set of uniform building regulations which can be amended, if necessary, to meet your own regional and local conditions? .....

SOUTH AFRICAN BUREAU OF STANDARDS

SPECIFICATIONS AND CODES OF PRACTICE

PUBLISHED

The following specifications and codes of practice have been published and are obtainable from the Bureau at 5/- each, post free:

S.A.S.I. 21-1947. Flat and corrugated asbestos cement sheets, including ridging, barge boards and flashings.
S.A.B.S. 1-1947. DDT insecticides.
S.A.B.S. 02-1947. Nomenclature for South African home-grown timbers, including natural habitat and weight.
S.A.B.S. 2-1947. Storage batteries for use in motor vehicles.
S.A.B.S. 03-1947. Code for protection of buildings from lightning.
S.A.B.S. 5-1947. Graded South African softwood timbers.
S.A.B.S. 4-1947. Standard sizes for door-locks.

IN COURSE OF PUBLICATION

Meter testing code.
Aluminium bronze ingots.
Brass ingots.
Ferro-chromium.
Ferro-manganese.
Ferro-silicon.
Silico-ferro-manganese.
Manganese bronze ingots.
Phosphor bronze ingots.
White metals.
Gun-metal ingots.
Solders, soft.
Solders, silver.
Oils, re-refined.
Castor oil, dehydrated.
Polishes, floor, wax, emulsion type.
Polishes, floor, wax, solvent type.
Silver, marking of articles made of.
Salt (S.A. Standards Institution).
Colour code for workshops and factories.
General requirements of electrical materials and equipment (safety code specifications).
Heaters, electric, immersion, portable (safety code specification).
Protective filters for welding and other industrial operations.
Fireclay and silica refractories.
Tests for refractory materials.
Canned fruits.
Canned vegetables and mixed vegetables.
Jams, jellies and marmalades.

UNDER REVIEW FOLLOWING COMMENT

Milk and milk products, apparatus for determining the percentage by the Gerber method.
Milk, glass bottles for distribution of.
White Lead paste-in-oil.
White Lead paint pigment.
Dyestuffs for use in foodstuffs.
Airbreak switches (safety).
Dermatitis, industrial, prevention and treatment.
Power-driven woodworking saws.

ISSUED FOR COMMENT

Antiseptics, pine oil and chlorinated xylenol derivative.
Disinfectants.
Blankets.
Washing machines, domestic, electric (safety).
Kettles, jugs and saucepans, electric (safety).
Radiators, electric (safety).
Water heaters, electric fixed (safety).
Heater and heater elements (replacement types) (safety).
Hand lamps, electric portable (safety).
Plug and socket outlets (safety).
Socket outlet adapters (safety).
Cords, rubber-insulated flexible.
Cables, vulcanised rubber insulated.
Building regulations, loads.
Brickwork.
Regulations covering foundations.
Regulations covering the use of plain, lightweight, nofines and reinforced concrete.
Standard shapes and sizes of refractory bricks.
Walls.
Building inspector's diploma.
Black nuts and bolts.
Eye protection, industrial.

IN COURSE OF PREPARATION

BUILDING MATERIALS, ETC.

Timber preservation.
Timber preservatives — acid cupric chromate, flour - chrome - arsenate - phenol,

pentachlorphenol, zinc chloride, zinc-meta-arsenite and metallic naphthenates.
Capliners.
Tiles or blocks, gypsum.
Sinks, stainless steel.
Roof ventilators, test code for.
Bars in concrete reinforcement, bending dimensions of.
Plasters and mortars.
Sand for plaster and mortars.
Paint pigments, zinc oxide.
Technical gelatine.
Bituminous roofing, mineral stabilised compounds.
Bituminous roofing materials, application of.
Bituminous road binders.

BUILDING REGULATIONS.

Amenities and facilities.
Carcase of buildings.
Comforts and precautions.
Farm dairy buildings.
Mechanical ventilation, heating, refrigeration and vacuum installations.
Reinforced concrete design.
Sanitation and water supply.
Structural steel.
Timber.

TEXTILES.

Calico, bleached and unbleached.
Drill, white and khaki.
Sheeting, bleached and unbleached.
Shrouding.
Dressings, surgical.
Wool.
Felt floor coverings.

ELECTRIC SAFETY CODE

Bread toasters.
Lamps, for table.
Smoothing irons.
Stoves and ranges.
Table-stoves and hot-plates.
Washboilers, domestic.
Earth leakage, protective devices.
Lampholders, bayonet.
Lampholder adaptors, bayonet.
Lampholders Edison, screw.
Insulating mouldings.
Fuses, iron-clad.
Vacuum-cleaners, portable.
Towel driers.
Grinders, sanders, etc., portable.
Irons, soldering.
Electrical fractional horsepower motors.

GENERAL.

Sampling, methods of.
Standard report forms for industrial accidents.
Water standards.
Chalks.
Stationery.
Laundry powders and liquid soaps.
Polishes, metal, liquid and paste.
Polishes, wax, boot.
Polishes, wax, stoep.
Bore-hole tools, coupling threads for.
Stainless steelware for hospitals, hotel and home use (basins, dishes, etc.).
Picks, shovels, spades, forks.

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.:

Welverdiend: The erection and completion of twelve houses and out-buildings at Welverdiend. C.C.E. 147. (Deposit of £2-2-0). Due, 10/3/49. Resident Engineer (Construction), 14, Leyds Street, Johannesburg.

Cape Town: The erection and completion of catering stores and offices at Cape Town. (Deposit of £5-5-0). Due, 10/3/49. Chief Civil Engineer, Room 27, Railway Headquarters, Johannesburg.

Port Elizabeth: The erection of the new South End Grey Primary School in the Port Elizabeth Division. The School Board, Port Elizabeth. Architects: Owen Eaton and Merrifield, Port Elizabeth. Due, 8/3/49.

ENGINEERING EQUIPMENT, ETC.:

Utrecht Municipality: (a) Supply; (b) Supply and installation of the following: Section 1: Cable. Section 2, Transformer. Section 3, Switch gear and fuse boards. Section 4. Hard drawn copper wire. Section 5, Poles. Section 6, Sundries. (Deposit of £3-3-0). Town Engineer, Utrecht. Due, 14/4/49.

POWER PLANT, ETC.:

Louis Trichardt Municipality: Power plant distribution material: Two 400 k.w. turbo-alternators and condensing plant. Spec. L.T. 1/1948. Boiler, economiser and draft plant, Spec. L.T. 2/1948; Circulating water pumps and motors, pipe work and spray gear, Spec. L.T. 3/1948; Distribution switch gear, cables, transformers, etc., Spec. L.T. 4/1948. (Deposit of £3-3-0 — extra copies of documents at £1-0-0 each). Consulting Engineer, J. S. Clinton, Preston House, Simmonds Street, South Johannesburg. Due, 15/4/49.

RAILWAYS:

Johannesburg Municipality: Steel bars. No. 8433. Due, 21/4/49; Light industrial tractors, No. 8511. Due, 31/3/49; Rectifier, No. 8687. Due, 17/3/49; Iroko Boards. No. A.14. Due, 24/3/49; Pump. No. 8682. Due, 31/3/49.

TELEPHONE AND TELEGRAPH:

Durban Municipality: Private Intercommunication Telephone System for the Mayoral Suite. Contract No. P.305. Specification and tender forms available at Telephone Exchange, Field Street, Durban. Due, 11/3/49.

VEHICLES:

Johannesburg Municipality: Diesel-engined omnibus chassis. Contract 762. Double-decked omnibus bodies. Contract 763. Due, 14/3/49. City Treasurer, Johannesburg.

WATER SUPPLIES, ETC.:

Mossel Bay Municipality: Augmentation of water supply. Pipes, valves, specials and fittings. Contract 28/1948. (Deposit of £10-0-0). Consulting Engineer, Ninham Shand, 806, Groote Kerk Bldg., Cape Town. Due, 16/4/49.

City of Salisbury, Southern Rhodesia: Water Scheme. Contract H.W./2, 1949. Supply and delivery of Sluice Valves, Air Valves and Accessories for 30-inch diameter pumping main. Tenders are hereby invited for the supply and delivery of material under the above contract. Tender documents in triplicate may be obtained from the City Engineer, Municipal Offices, Salisbury, or from the Consulting Engineers, Messrs. Stewart, Sviridow and Oliver, Balgownie House, 66, Commissioner Street, Johannesburg (P.O. Box 6672)), upon receipt of a deposit of £10-10-0 in favour of the City Council of Salisbury,

which deposit will be refunded within two months of the receipt of a *bona-fide* tender. Extra copies of the documents may be purchased at a charge of £2-2-0 per copy. Tenders are to be completed in accordance with the conditions attached to the Documents and must be sealed, endorsed "Contract H.W.2/1949" and deposited in the Town Clerk's Tender Box, Municipal Offices, Salisbury, before 12 noon on Thursday, 31st March, 1949.

The Council does not bind itself to accept the lowest or any tender. F. J. Lovatt, Town Clerk.

WATER SUPPLIES, ETC.:

Vereeniging Municipality: Supply, delivery and erection of 2.2. k.v. switch board in the compressor house, Vereeniging Main Pumping Station. Contract 717. (Deposit of £3-0-0 — additional copies of documents at £1-0-0 per copy). Due, 29/3/49. Chief Engineer, 3, Fraser Street, Johannesburg. Rand Water Board, P.O. Box 1127, Johannesburg.

Pietermaritzburg Municipality: The supply, delivery and either (a) erection of (b) supervision of erection of pipes, valves, plant and materials for the new filtration plant. Contract C.E. 2/1949. (Two sets of contract documents on deposit of £2-2-0). Due, 17/5/49. City Engineer, Pietermaritzburg.

MISCELLANEOUS:

Centrifugal sludge pumps: City Treasurer, Johannesburg. No. 785. Due, 17/3/49.

Electrical conduit: City Treasurer, Johannesburg. No. 786. Due, 18/3/49.

Centrifugal pumps: City Treasurer, Johannesburg. No. 787. Due, 17/3/49.

Hydro-electric plant and penstock: Contract E. 1/1948. Town Clerk, Stanger. Due, 17/3/49.

Hardwood Boards for covering underground electric cables. Specification 1514/1948. Due, 31/3/49.

Cable jointing material (barrier joints): Contract 1542/1949. City Electrical Engineer, Cape Town. Due, 30/3/49.

Offers for the purchase of one Sartorius micro-balance, type M.D. 4, capacity 20 grams, sensitivity 0.001 milligram. Town Engineer, Germiston. Due, 16/3/49.

L.T. Distribution fuse link boards: Contract 768. City Treasurer, Johannesburg. Due, 17/3/49.

Relays: Specification 335. Controller of Stores and Buyer, Pretoria West. Due, 7/3/49.

Grader Blades: No. 73/48. Provincial Roads Engineer, P.O. Box 417, Pietermaritzburg. Due, 9/3/49.

Invalid wheel chairs and spare wheels for sale: Provincial Accountant, P.O. Box 11, Pietermaritzburg. Due, 9/3/49.

●

"AUTOBAHNEN" FOR BRITAIN

UNDER the Special Roads Bill, published towards the end of last year by the British Government, Britain may soon begin to construct a network of roads similar to the German "autobahnen." Those who remember G. K. Chesterton's fanciful strictures on the roads of Britain will recall that in his amusing poem, "The Rolling English Road," he wrote :—

> "Before the Roman came to Rye or out to Severn strode
> The rolling English drunkard made the rolling English road."

And a little later on he capped all this with the line :—

> "That night we went to Birmingham by way of Beachy Head."

One may, therefore, be tempted to think that reform of the English road has not been undertaken before its time.

The opening clauses of the Bill authorise the British Ministry of Transport, or any other highway authority to construct such a road. The Bill provides for the transfer to the special road authority of any part of an existing road included in the route prescribed by any particular scheme. It also allows for the carrying out of works on adjoining side roads, the stopping up of junctions between the special road and other roads and the provision of connections, where necessary, between the special road and other roads.

Clauses 4, 5, and 6 of the Bill give the special road authority not only power to prevent statutory undertakers and sewerage authorities to lay new mains along or across a special road, without the permission of the special road authority concerned, but also give the authority power to apply for an order to extinguish the rights of statutory undertakers and sewerage authorities to lay mains in the land acquired for special roads and to require the removal of existing mains.

Although provision is made for compensation, Clause 7 permits a special road authority to stop up private means of access to premises, adjacent to the new road, and to provide the necessary alternative means of access.

There is power granted under clause 8 for the transfer of privately owned bridges to the special road authority which is also authorised to construct bridges over or tunnels under navigable water, if these should form a necessary part of a special road scheme.

Under clause 12 the Minister of Transport can frame regulations prescribing the type of traffic which shall use the new roads and the maximum speeds at which that traffic shall be permitted to travel. Persons using or crossing a special road in contravention of the regulations to be laid down may be liable, on summary conviction, to a fine of £20 or, in the case of a second or subsequent conviction, to a fine of £50 or imprisonment up to three months.

So far as finance is concerned the Road Fund will defray expenses in connection with the construction, maintenance, repair or improvement of roads. It will also make such advances as may be necessary and meet administrative expenses.

This application of Road Fund money to this purpose removes a grievance long felt by British motorists, whose licence fees and petrol tax paid into the Fund have been con-

A road junction on one of Britain's new proposed "special roads." Fast traffic either way will continue at different levels while cycle and pedestrian lanes can also utilise the flyover at varying heights.

sistently appropriated by successive Chancellors of the Exchequer ever since Mr. Winston Churchill started the fashion about a quarter of a century ago. Instead, British motorists will get the roads for which the Fund was first inaugurated.

The Bill envisages the construction of 1,000 miles of fast motor ways, pedestrian paths, national parks and cycle ways. Although the total cost of the project has not yet been calculated it is estimated that motor ways will cost £150,000 and all-purpose roads £170,000 per mile.

●

BECHUANALAND WATER RESOURCES

Précis of a Report on this territory which, in common with Northern Rhodesia, Nyasaland, Tanganyika, Kenya and Uganda, were surveyed by Frank Debenham, O.B.E., M.A., Professor of Geography at Cambridge University. The Report is published for the British Colonial Office by H.M. Stationery Office.

In the past several factors have made Bechuanaland unknown and remote. Not least have been its vast area, 275,000 square miles, and its low density of population, less than one per square mile.

There has also been its inaccessibility by normal means of travel for, though the railway line from the Cape to the north passes inside the eastern border of the Protectorate for nearly 400 miles, hardly anyone stops to look at the country. If they did, they would find that travel westward, away from the railway and the main road, is difficult for cars at any time and impossible at certain seasons. The very names of "The Kalahari Desert" and "The Great Thirstland," coupled with infrequent railway stations, numerous small bridges crossing dry, sandy river beds and the rarity of even native villages do not combine to impress visitors favourably.

Yet it would not be unfair to say that Bechuanaland has suffered from an excess of large-scale projects, promoted and reported upon by outsiders, while the more humdrum job of getting on with development on a practicable scale has been left to a very small group of administrators and technical staff with very small resources behind them.

Three Natural Divisions

Rainfall, relief and soil combine to suggest a threefold division of the Protectorate for the purpose of planning developments.

1. **The Eastern Zone or Railway Belt** comprises a strip of country from 30 to 80 miles wide bordering the railway. Its rainfall is uncertain, but the average over a period of years is round 20 inches.

This belt is almost the only part of the Protectorate which enfolds rocky hills, sometimes grouped into actual low ranges, with well-defined valleys, some of which have perennial streams in any but drought years. In the rainy season most of these streams have impressive discharges and there is a sufficiency of promising sites for reservoirs to encourage a policy of surface conservation, already begun in the south-east,

at Kanye and Ramoutsa, with irrigation as part of its objective.

The fertile Kalahari sand has drifted over the Railway Belt and produced a pasture rivalling the famous grasses of the mid-western areas of the United States or the back-blocks of New South Wales. This excellent pastoral land has two great drawbacks—lack of watering points for stock and prevalence of cattle diseases. The latter is partly due to the former.

2. **The central zone of the Kalahari** is a very wide belt, occupying three quarters of the Protectorate. Its rainfall is unreliable, ranging from 5 to 10 inches. There are few hills and it is uniformly sandy. Towards the south-west the area is, probably, incapable of much development but in the centre, near the Marikari depression, there are opportunities.

The very fertile sand produces a nutritious but thin pasture. With sufficient watering points it could be stocked with one beast to every 15 to 40 acres. There is plenty of underground, though brackish, water. For the comparatively few inhabitants a vigorous programme of well-sinking could do much.

3. **The North West Division** is quite different from the rest of the Protectorate and presents possibilities for development of quite an unusual order. While the Olifants Kloof and Ghanzi are marginal country, the Okavango-Chobe area not only has a better rainfall, averaging about 20 inches, but receives an enormous quantity of water from outside the territory.

Sources of Water

The Protectorate has practically no rivers, though there are a multitude of dry and rather ill-defined water courses which run furiously for a few days in the year. Of the few streams sufficiently perennial to deserve the name of river, the Notwani, in the extreme south-east, is the most important. Some of its watershed lies within the Union and for a few miles it forms the boundary but three-quarters of its watershed, above Mochudi, is in the Protectorate.

A promising reservoir site would be the River Marico, which ultimately becomes the Crocodile River and the Limpopo, at Derdepoort. Here, on the boundary, it could serve both the Union and the Protectorate. Two other rivers merit survey with regard to surface conservation. They are the Shashi, running close to Francistown and emptying into the Limpopo, as well as the Nata river running into the Marikari depression.

Under the Kalahari sands a series of boreholes has been put down on the route from Serowe to Rakops. They have, in the main, been successful at depths from 60 to 200 feet. But the greater part of the Kalahari is so forbidding that any water development programme must, for some time to come, be confined to stock units only.

The proposal of the late Professor Schwartz and the survey of Dr. A. L. du Toit have made the Okavango swamps well known. The validity of the former's scheme has, however, since been disproved. Yet, if the swamps were drained rather than flooded, the water could be passed to a deeper reservoir (to avoid the heavy evaporation experienced) or directly on to the land.

A Second Sudan?

Obviously economic factors are inseparable from the development of the water resources of the North-West Division of the Protectorate. In course of time the area, with its ample water supply, could become a second Sudan, growing cotton or other products for export, provided it had reasonable access to the sea. The most natural access would be by means of a railway to Walvis Bay or to a new port at the mouth of the Cunene. A preliminary survey for a trans-Protectorate railway has already been made, running from the Rhodesian Railways in the vicinity of Wankie to the South West African railway at Gobabis, some 600 miles. It could almost equally well go to Grootfontein.

●

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.

ARCHITECTURE.
COWGILL, Clinton Harriman and Ben John Small.
Architectural practice . . . New York, Reinhold Publishing Corporation, c1947.
v, 396 p.
Reference 31/11. Classification 72.00.

BASE SLAB.
BENSCOTTER, Stanley U.
A symmetrically loaded base slab on an electric foundation . . . . with discussion. New York. American Society of Civil Engineers, 1944. (Paper No. 2220.)
Reference 33/10. Classification Pam. 624.073.72.

BRICKLAYING.
NEWMAN, A. J.
Concrete and bricklaying in cold weather. London, H.M. Stationery Office, 1948 (National building studies, Bulletin No. 3).
Reference 33/16. Classification Pam. 693.5+693.2.

BRICK WORK.
McKAY, W.B.
Brickwork . . . London, Longmans, Green & Co., 1945. (Building Craft Series).
192 p. diagrs.
Reference 30/17. Classification 693.2.

BRIDGES.
HOOL, George A. and W. S. Kinne.
Movable and long-span steel bridges . . . revised by R. R. Zipprodt and H. E. Langley . . . second edition . . . New York, McGraw-Hill Book Co., Inc., 1943.
xiv, 497 p. illus., tables, diagrs. (some folding).
Reference 31/22. Classification 624.8.014.2.

BUILDING.
United States. National Bureau of Standards.
Design and construction of building exits . . . Washington, Government Printing Office, 1935. (Miscellaneous publication M.151).
76 p. tables, diagrs.
Reference 30/19. Classification Pam. 69.028.

BUILDING APPRENTICESHIP.
Building Apprenticeship (London). Building apprenticeship and training council. 1948. Illus. (photos).
Ref. 33/20. Classification Pam. 69.331.861.

BUILDING FINANCE.
TOWNSEND, Walter and Leonard.
Costing for builders . . . London, E. & F. N. Spon Ltd., 1948. (Architectural and building series).
76 tables.
Reference 30/20. Classification 69.003.12.

BUILDING RESEARCH.
Australia. Council for scientific and industrial research.
Fourth Annual Report, year ended 30th June, 1948. Melbourne, Building materials research, 1948.
26 p. Mimeographed.
Reference 30/26. Classification Pam. 691 : 061.6(94)(047.1).

CEMENT.
United States. Department of Commerce.
Bibliography of reports on cements and concrete . . . Washington, Office of Technical Services, 1948.
25 p. Mimeographed. 2 copies.
Reference 30/30. Classification Pam. 666.9 : 016.

CERAUNOMETERS.
GANE, P. G. and B. F. J. Schonland.
The Ceraunometer: a device to record the number of lightning discharges within a given radius. Bernard Price Institute, Johannesburg. 1948.
Reference 33/27. Classification Pam. 551.50894.

CITY PLANNING.
LE CORBUSIER.
The city of to-morrow and its planning ; translated from the eighth French edition of "Urbanisme" by Frederick Etchells. London, Architectural Press (1947).
310 p. illus. (photos), diagrs.
Reference 30/42. Classification 711.4.

COAL HANDLING.
Mechanical Handling of Coal: an annotated list of articles published between 1937 and 1947; by R. Ruedy, Ottawa, National Research Council, 1948.
Reference 33/32. Classification Pam. 622.771.622.33 :014.3 :05.

CONCRETE MIXING.
Design of concrete mixes. Department of Scientific and Industrial Research, Road Research Laboratory. London. H.M. Stationery Office.
Reference 33/39. Classification Pam. 625.84.

DAMPNESS IN BUILDINGS.
United States. Department of Agriculture.
Remedial measures for building condensation difficulties; by L. Teesdale . . . Madison, Forest Products Laboratory, 1947. Report No. R 1710).
14+p. photos., graphs, tables. Mimeographed.
Reference 30/50. Classification Pam. 699.82.

DOORLOCKS.
South African Bureau of Standards. 1947. Pretoria.
Specification for standard sizes for doorlocks.
Separate title page and text in Afrikaans.
(Copies obtainable from S.A.B.S., Private Bag 191, Pretoria. Price 5/-.)
Reference 33/47. Classification Pam. 683.33.

EDUCATION.
REAY, D. B.
Some Thoughts on Education: presidential address to the S.A. Institution of Engineers; with contributions by H. R. Raikes and Bernard Price. Johannesburg, Electricity Supply Commission, 1948.
Reference 33/49. Classification Pam. 37(042.5).

ENGINEERING RESEARCH.
GIFFEN, Edmund.
Engineering research in the University: the inaugural lecture in the Chair of civil and mechanical engineering given in the University of London, Queen Mary College, London.
Oxford Univ. Press. 1946.
This lecture was mainly a plea for closer co-operation between the Universities and industry with regard to engineering research.
Reference 33/60. Classification Pam. 378.4 :62 :061.6.

FUEL RESEARCH INSTITUTE (South Africa).
Annual report for the Fuel Research Board of the year ended 31st December, 1947. Pretoria. Government Printer. 1948.
Reference 33/78. Pam. 662.6.061.6(68.01)(047.1).

HEAT
SNEEDEN, J. B. O.
Applied Heat for Engineers. London, Blackie and Son.
Reference 33/86. Classification 536 : 62.
OVERTON, Louis J.
Heating and ventilating: embracing hot water supply and air treatment ; sixth edition . . . edited by Frank Herod . . . Manchester, Sutherland Publishing Company, Ltd., 1946.
vii, 337p.+p. illus., tables, diagrs.
Reference 31/89. Classification 628 :8.

HOUSES.
MADGE, John, ed.
To-morrow's houses: new building methods, structures and materials . . . London, Pilot Press Ltd., 1946.
336 p. illus. (some photos.), diagrs.
Reference 30/81. Classification 69 :728.

HOUSING. Kenya.
OGILVIE, G. C. W. **comp.**
The housing of Africans in the urban areas of Kenya, Nairobi, Kenya Information Office, 1946.
Main sections: Sociological and economic factors; conditions to-day. The African housing scheme at Makongeni, Nairobi. The Nairobi municipal African housing scheme at Ziwani, Nairobi; the government African housing scheme, Mombasa; etc.
Reference 33/87. Classification Pam. 728.1 :323.1(676).

HUMIDITY.
MARSH, M. C.
Controlled Humidity in Industry. London, Charles Griffin and Co., Ltd. 1935.
Reference 33/88. Classification 628.84.

INSULATION HEAT.
ALLCUT, E. A.
Properties of heat insulating materials. Toronto, University of Toronto, 1941. (School of Engineering Research, Faculty of Applied Science and Engineering, University of Toronto, Bulletin No. 169, 1941.)
12 p. illus., tables, diagrs.
Reprinted from the Engineering Journal, November, 1941, the journal of the Engineering Institute of Canada.
"A discussion of the character of heat insulating materials, the difficulties in determining their relative value experimentally, the effect of air spaces and surface resistance and the possibility of saving fuel by taking advantage of solar radiation and heat stored in the structure of the building itself. Mr. Hamly contributes an appendix describing his microscopic examination of a number of insulating materials."
Reference 31/99. Classification Pam. 699.86.

LIGHTING.
MOON, Parry and Domina Eberle Spencer.
Lighting design . . . (Cambridge, Mass. Addison-Wesley Press Inc., c1948).
482+p. plates, (some col.), tables, diagrs.
Reference 31/107. Classification 628.9.

OXFORD.
SHARP, Thomas.
Oxford replanned . . . London, Architectural Press for the Oxford City Council, 1948.
224 p. plates (photos. some col.), illus. (photos. some col.), tables, diagrs. (some col., some folding).
Reference 31/120. Classification 711.4(425.7).

PISE DE TERRE.
ARCHIBALD, A. J. and others.
. . . Cheap building by pise de terre methods, by A. J. Archibald, Alec J. T. Crosby and R. L. Patty. Johannesburg, South African Institute of Race Relations, 1948.
56 p. illus., plates, diagrs.
Published with assistance of the Bantu Welfare Trust.
Reference 31/128. Classification Pam. 691.41.

PLASTIC MATERIALS.
BARWELL, F. T. and K. W. Pepper.
The swelling of reinforced plastics. London, The Faraday Society, 1946. Reprint.
Reference 33/128. Classification Pam. 679.5.

ROADS.
MACLEAN, D. J.
Department of scientific and industrial research.
The effect of the soil foundation on the road surface: an

outline of existing knowledge. London, H.M. Stationery Office. 1948.
Reference 33/144. Classification Pam. 625.7.041.

ROOFS.

WILSON, J. Douglas and S. O. Werner.
Simplified roof framing . . . second edition. New York, McGraw-Hill Book Co. Inc., c1948.
ix, 160 p. tables, diagrs.
Reference 31/150. Classification 69.024.

SAWDUST.

HARRIS, P.
Burning Sawdust. London, Nema Press Ltd. 1942.
Reprinted from Wood, March, 1942.
Notes are given on various types of furnaces for burning sawdust (Dutch oven type, Burmese type; Combined hopper and stove; modified Burmese type etc.).
Reference 33/154. Classification Pam. 674.82.662.63.

SCHOOL BUILDINGS.

BURSCH, Charles Wesley and John Lyon Reid.
You want to build a school? . . . New York, Reinhold Publishing Corporation, c1947.
128 p. illus.
Bibliography: pp. 113-118.
"The procedure of administering a planning and building programme of a school district is the main concern of this book . . . In chapters 2 and 3 the people, the agencies, the laws, and the instruments of operation are isolated and examined . . . Chapter 4 describes what happens when a school district plans, designs and builds a school plant . . . Chapter 5 tells how to get the most use out of the school plant as an educational instrument. Chapter 6 deals with miscellaneous but useful information. Chapter 7 sets up criteria for the work of state agencies in the school housing procedures . . . . Chapter 8 contains bibliographical material." — Introduction.
Reference 30/140. Classification 727.1.

SCIENTIFIC RESEARCH, East Africa.

WORTHINGTON, E. B.
Research services in East Africa. London, Nature, 1948.
Reference 33/156. Classification Pam. 5+6:061.6.(676).

SEWERAGE.

BABBITT, Harold E.
Sewerage and sewage treatment . . . sixth edition. New York, John Wiley & Sons, Inc., 1947.
xix, 692 p. illus., tables, diagrs.
Bibliography: pp. 618-642.
Reference 30/143. Classification 628.2/.3.

SHORING AND UNDERPINNING.

PRENTIS, Edmund Astley and Lazarus White.
Underpinning: its practice and applications . . . New York, Columbia University Press, 1931.
xxi, 318 p. front., illus. (photos.), diagrs.
Reference 31/152. Classification 624.159.4.

SOUTH AFRICA.

Union of South Africa. State Information Office.
Government Printer, Pretoria. Illus., photos, maps, tables, diagrams. (Copies obtainable from the State Information Office, Craigielea, Pretoria.)
Reference 33/165. Classifiication Pam. 916.8.

SOUTH AFRICAN MUSEUM.

South African Museum, Cape Town. Report, for the year ended 31st December, 1947. Also issued in Afrikaans.
Reference 33/166. Classification Pam. 069(682)(047).

STATE LIBRARY.

Pretoria State Library.
Report of the trustees for the year ended December 31, 1947. Two title pages, one in Afrikaans. Text separately in Afrikaans and English.
Reference 33/171. Classification Pam. 027.54(682)(047.32).

STRUCTURAL ENGINEERING.

SPOFFORD. Charles M.
The theory of structures . . . fourth edition . . . New York, McGraw-Hill Book Co., Inc., 1939.
xvi, 615 p. tables, diagrs.
Reference 30/162. Classification 624.04.

TIMBER RESEARCH LABORATORY, Johannesburg.

Transvaal Chamber of Mines.
Timber Research Laboratory. 1941-1945.
Annual Report.
Reference 33/180. Classification Pam. 674:061.6.(682).

TOWN PLANNING.

WRIGHT, H. Myles, ed.
The planner's notebook: a compendium of information on town and country planning and related subjects . . .
ix, 389 p.
Reference 30/168. Classification 71(021).

TUNNELS AND TUNNELLING.

Joint intelligence objectives sub-committee.
The German "Kunz method" for excavating tunnels. London, H.M. Stationery Office, 1946.
. . . "Basically, it was Kunz's idea to substitute a steel shell which would not only carry the rock load but would also be available as form work for the concrete work."
Reference 33/184. Classification Pam. 624.191.24(43).

WALLS.

United States. National Bureau of Standards.
. . . Structural properties of a reinforced-brick wall construction and a brick-tile cavity-wall construction, sponsored by the Structural Clay Products Institute; by Herbert L. Whittemore, Ambrose H. Stang and Cyrus C. Fishburn. Washington, United States Government Printing Office, 1939.
(Report BMS 24).
ii, 17 p. illus. (photos.), diagrs.
Reference 30/177. Classification Pam. 69.022.001.4.

WATER POLLUTION.

PHELPS, Earle B.
Stream sanitation . . . with a chapter on stream microbiology, by James B. Lackey . . . New York, John Wiley & Sons, Inc., c1944.
xi, 276 p. front., illus., tables, diagrs.
Reference 31/177. Classification 628.115.

WOODBORING INSECTS.

FISHER, R. C.
Some timber insect problems in utilization in the tropics. London, H.M. Forestry Commission, 1947.
. . . "Attention is drawn to some of the more important types of damage caused by wood-boring insects to timber in the tropics, and their effect upon closer utilization."
Reference 33/102. Classification Pam. 674:620.193.87.

View of the "Powermaster" — a compact three-fuel steam generating unit described on the next page.

TECHNICAL NOTES

New Steam-Generating Unit Burns Three Fuels

A NEW American-made generating unit, which burns light oil, heavy oil or gas, has just been developed by Orr and Sembower, Inc. All three fuels are burned with the same burner, making a change-over from one fuel to another a matter of only ten minutes or less. Usually a fuel switch from light oil to heavy oil is a major operation, requiring several hours.

The new " packaged " unit provides full steam pressure in as little as 18 minutes. It ranges from 15 to 250 H.P. and is especially useful in food or chemical processing industries, in the textile field and in bottling, dairy, cleaning and laundry plants. It also provides economical steam for heating and can be widely used in hotels, hospitals, and commercial or institutional buildings.

The " Powermaster " steam generator is fully automatic. It burns heavy fuel with the same complete clean combustion with which it burns light oil or gas. Fully automatic operation of heavy fuel combustion is another feature of the unit.

Other advantages are :—

1. High-low control of flame volume to maintain constant steam pressure as steam demand varies.
2. New simplified design which makes operation and maintenance easier than ever.
3. Free-swinging rear cover which makes tubes quickly accessible for cleaning. The tubes can be exposed in three minutes.
4. A new air-atomizing burner which promotes complete and very clean combustion for various combinations of fuel.
5. Safety features for flame failure. An electronic fire-eye (for oil) and a flame rod (for gas) automatically shut off the boiler in case of flame failure.
6. All sizes are insulated and jacketed.

M. B. Koval and Company are the agents for the " Powermaster " in South Africa.

" Athey " ML–4 Mobiloader

THE " Athey " ML-4 Mobiloader is, in South Africa, an addition to the more familiar types of earthmoving machinery. Powered by a non-oscillating five-roller, 60" gauge " Caterpillar " D-4 tractor, it operates on an entirely new principle.

For digging, its 1 cubic yard bucket is carried in front of the tractor. The tractor then moves forward to collect its load after which the bucket is raised vertically over the tractor into the carrying position. No turning of the tractor is necessary as the " Athey " Mobiloader discharges its load over the rear of the tractor.

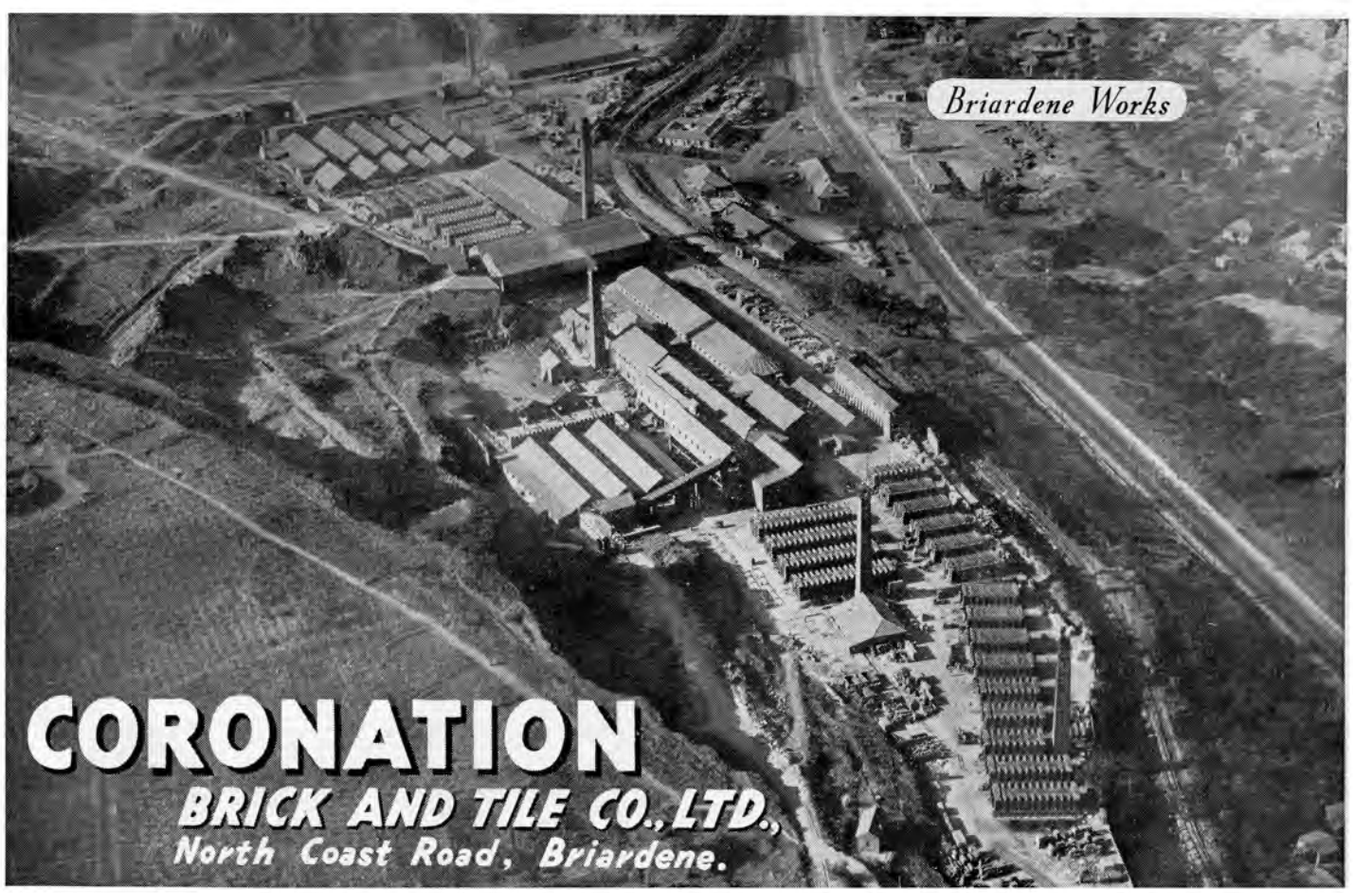
At work on the new Kempton Park airport—shifting soil with the Athey ML-4 Mobiloader.

The digging bucket is operated by cables which are hydraulically controlled by a vane-type pump, working from the front power take-off of the tractor. A single conveniently located lever controls all the operations.

The Mobiloader is designed to dig packed material such as sand, earth or gravel and its mobility makes it particularly suitable for loading material from stock pile to rail or lorry. It competes favourably with a normal shovel or dragline in such operations, its mobility being a particular advantage and enabling it to work under difficult conditions. It is claimed, in fact, that in one such operation, an ML-4 Mobiloader loaded three trucks to one previously loaded with a $\frac{3}{8}$ cubic yard shovel aided by a bulldozer. It can, on occasions, be used for grading roads and airfields, at the same time enabling the excess material to be quickly carted away.

A bulldozer blade can be supplied as optional equipment and it is only necessary to remove four pins to fit this in place of the bucket. This is an useful tool for making stock piles, etc., but it is not intended to be used on the heavy, continuous work undertaken by a normal bulldozer.

The " Athey " Mobiloader is supplied complete with its own tractor and deliveries are reasonably good, shipment at present being effected within six months. The South African agents are Thomas Barlow and Sons (S.A.) Ltd. The tractors are normally supplied with flat tracks to facilitate turning where this is necessary. Grouser tracks can, however, be supplied if specially required.



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," January, 1949.

69 (05).
Series DIS-2.

INFORMATION SHEET

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

Vermiculite in Building

6. Q: What are the uses of vermiculite in Building?

A: Exfoliated vermiculite is a light weight mineral material which is finding increasing application in building. It is an excellent thermal insulator, durable and fireproof.

It is used with success as a thermal insulator in the form of loose granules between the ceilings and roofs of buildings. As a concrete aggregate it yields a light weight concrete having good insulating properties but with inherent low mechanical strength which limits its use to applications where a low structural strength is permissible. Vermiculite concretes tend to have high water absorption and permeability and consequently they need weather protection in exposed locations.

Vermiculite plasters have low densities, good fire resistance, and fair thermal insulating and acoustical properties. Some difficulties may be expected in applying the plaster and special techniques are required. Mechanical plastering devices have been used overseas.

In the form of clay bonded bricks it has good insulating properties. In this form its high cost compared to conventional bricks limits its practical application to specialised cases of high temperature insulation.

In the form of slabs in which the exfoliated vermiculite is bonded with a binder, it possesses good thermal insulating properties but due to its friability it should be protected. Some difficulty has been experienced due to shrinkage of such slabs.

Many other applications are possible but those mentioned above are the main ones in which use is made of the special properties of this interesting material.

Colour in Industrial Buildings

7. Q: Should dark or light colours be used in industrial buildings?

A: Avoid large areas of strong colours, such as bright red, yellow or green. They are likely to cause eye-fatigue and after-images. Keep strong colours for identifying pipe lines, control-levers, etc.

Very light colours are best for general use, especially if applied in a plain uniform fashion, and not picked out in other shades. Light colours are preferable to reduce annoying contrast between task and background. However some contrast between the main colour and that of columns, machines or furniture is desirable to avoid monotony.

Termite Barriers

8. Q: Is the sheet-iron ant-guard a suitable termite barrier under South African conditions?

A: The South African Division of Entomology condemns this method of termite-proofing and bases its opinion on a survey of houses which have been fitted with such guards but which have nevertheless become infested with termites (white ants). The reasons for such failures are given as:

(i) Corrosion or lapses in the workmanship of fixing the guards lead to points of entry through the guard. A single such point of access defeats the whole purpose of the guard.

(ii) Unlike termites of the countries where the method originated, the most destructive South African species are not deterred by the guard. They are able to build mounds and nests which bridge directly from the soil of the sub-floor to timbers above. Access paths up the walls are therefore not essential and consequently the ant-guard fails to provide protection.

Revised recommendations, applicable to South African conditions, have been formulated. Protection is based on the simultaneous provision of the following measures:

(i) Attention to significant points of design and construction.

(ii) Soil-poisoning of the sub-floor.

(iii) Wood - preservation (by adequate means) of the timbers accessible from the soil.

Tornado Damage

9. Q: Is it practicable or economical to design houses to withstand damage by tornadoes?

A: The tornado is the most violent atmospheric phenomenon with which man has to contend. Its destructive power is so great that it is not considered practicable or economical to design houses to completely withstand its effects.

A tornado is actually a violent whirlwind with a diameter of only a few hundred feet. It is accompanied by violent updraughts and wind velocities in excess of 200 m.p.h. may be encountered. In addition, at the centre of the whirl-wind the pressure approaches that of a vacuum. This centre of the tornado travels rapidly across the surface of the ground and when it encounters any enclosed space such as a house a condition of high pressure inside and low pressure outside exists. The change takes place so rapidly that an explosive effect is created and the higher pressure inside the building blows the roof and walls outwards.

Examination of the recent damage at Roodepoort indicates certain constructional weaknesses in our building practice and the most evident of these are the methods of fastening the trusses on to the walls and the fixing of purlins to the rafters Better tying-down of the trusses with double clinched hoops and heavier nailing of the purlins to the rafters might have reduced the damage sustained. It should be emphasized however that although these precautions will assist in preventing damage it cannot be expected that any conventional construction can be made to withstand the full force of a tornado.

The question should really be viewed as one of risk and fortunately in South Africa the occurrence of tornadoes is comparatively rare. It is considered that the chance of any individual house being damaged within its normal lifetime is extremely small, probably of the order of less than one in fifty thousand.

Dirt Staining

10. Q: What is the cause of pattern-staining, that is the uneven deposition of dust over the surfaces of plasterboard walls and ceilings, and how can the trouble be overcome?

A: The phenomenon of dirt-staining has been shown to be the result of thermal precipitation of dust particles on surfaces cooler than the contiguous air and is typified by the blackening of ceilings and walls in kitchens. In the case of a plasterboard ceiling the heat flow through the part below the brandering is less than that transmitted through the rest of the ceiling so that during the cooler parts of the day the surface temperature below the brandering will be slightly higher than the temperature of adjacent areas on which dust will be deposited more readily. The result is a pattern of white bands on a dark ground.

It should be pointed out that pattern-staining can only occur if the ceiling surface is at a lower temperature than the air below it, a condition which in this country will usually occur during the night when heat will normally be lost through the roof-ceiling combination due to radiation from the roof to the clear sky. This explains why pattern-staining is most pronounced in rooms immediately below the roof.

One way of overcoming the trouble is to equalise the rate of heat transmission over the whole ceiling surface by the application of sufficient insulation over those parts where the blackening is deepest. Staining will still continue but patterns will be eliminated. A second procedure is to reduce the total transmittance of the roof-ceiling combination and so reduce the rate of blackening thus making the pattern less evident.

W.P. 64911 14-12-48