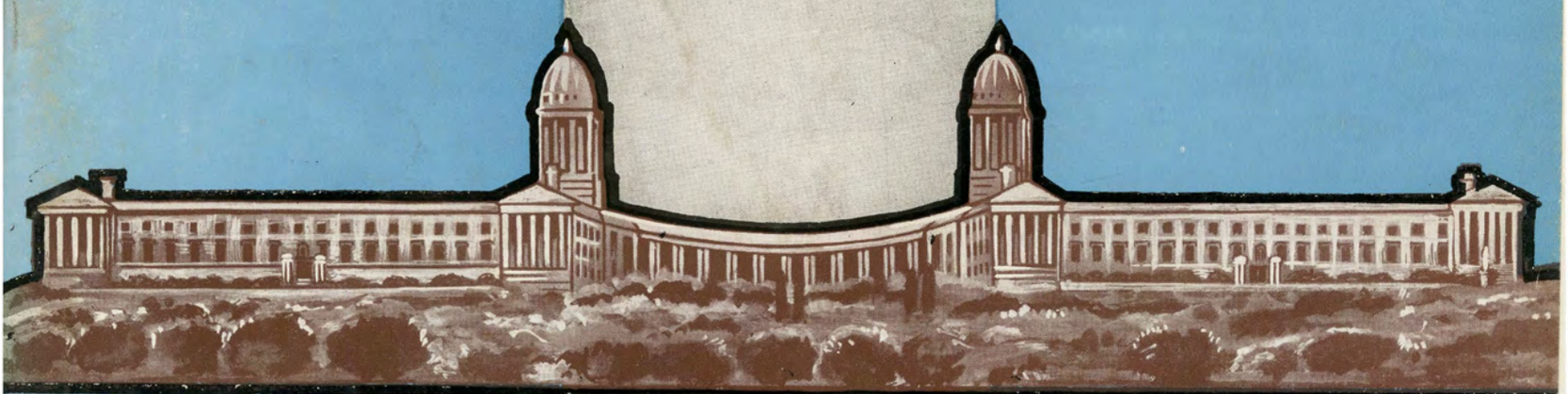
Vol. X. · No. 70. SEPTEMBER : 1949.

PUBLIC WORKS OF SOUTH AFRICA



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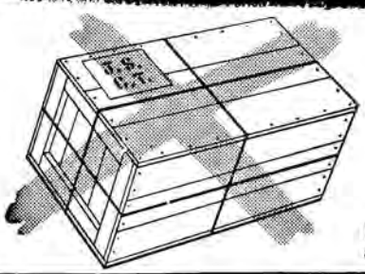
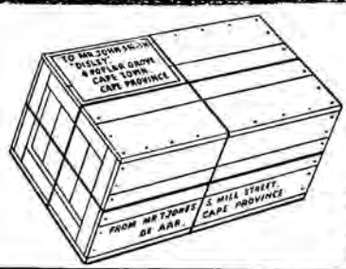
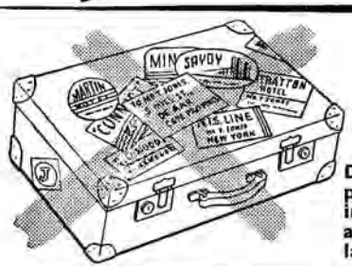
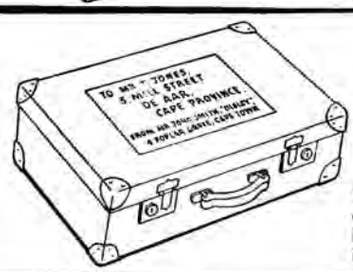
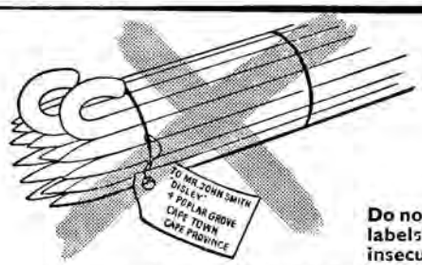
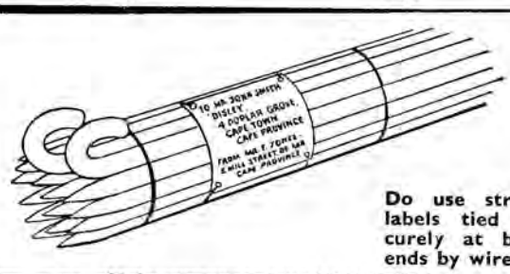
 Do not use abbreviations.	 Do paint or stencil all names and addresses distinctly and in full on the package itself, where possible.
 Do not send packages bearing old names and addresses or labels.	 Do remove or obliterate all old labels or markings.
 Do not use flimsy labels tied on insecurely.	 Do use strong labels tied securely at both ends by wire.

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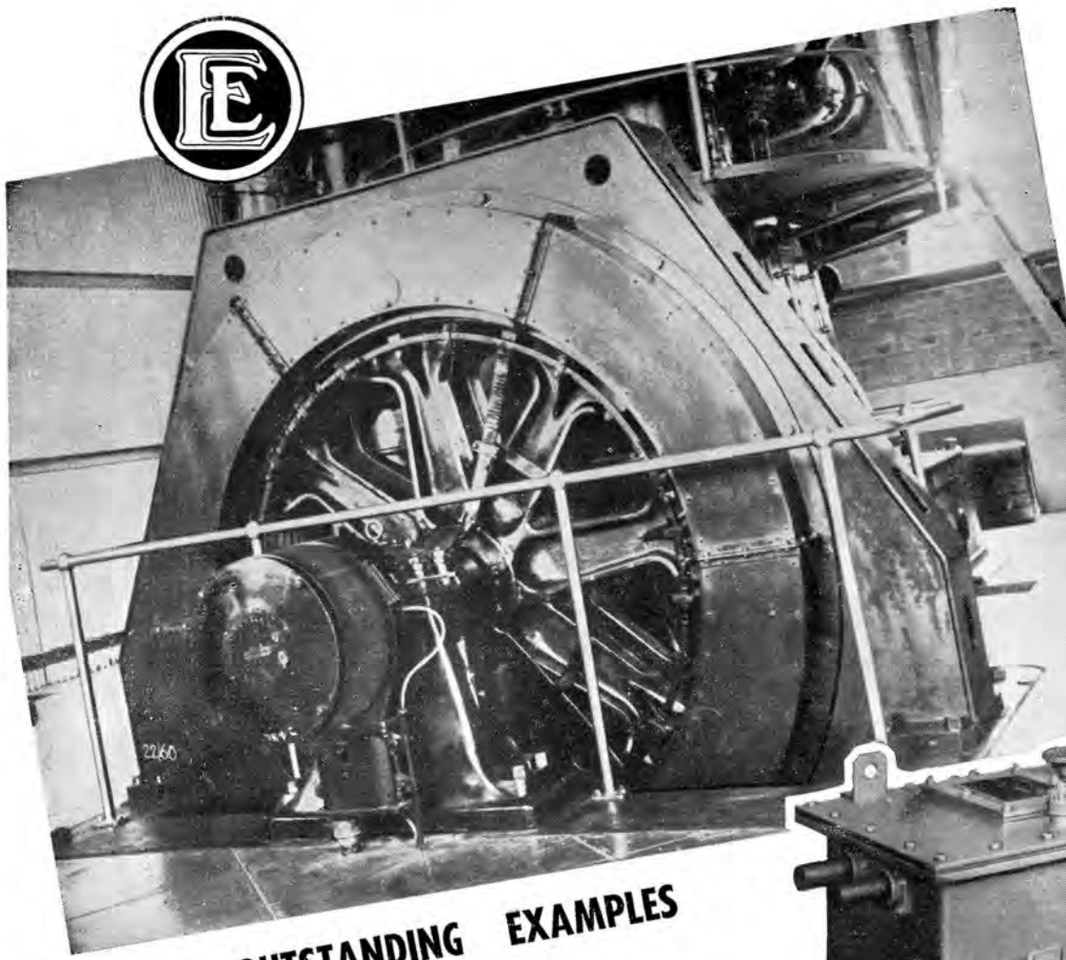

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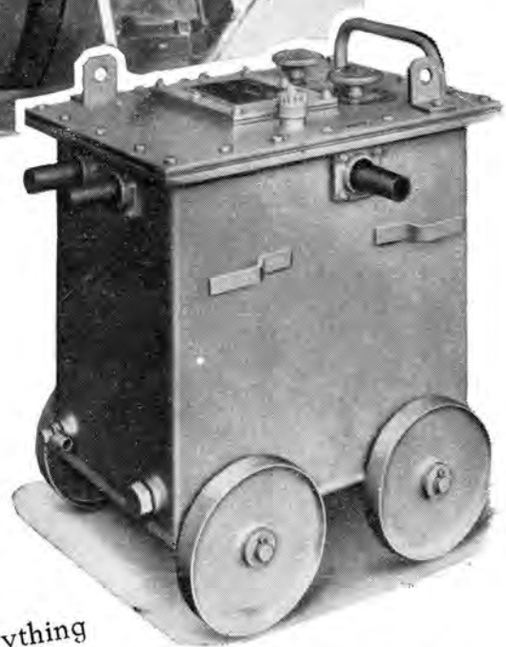

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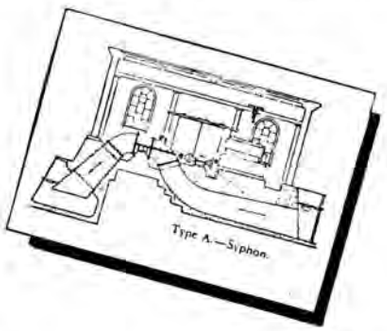
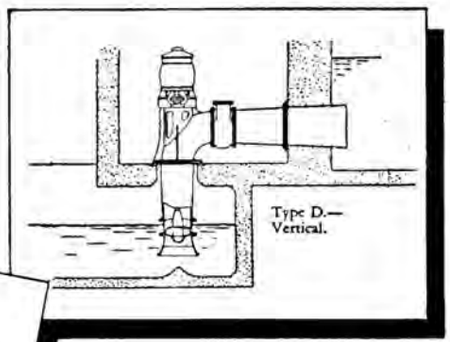
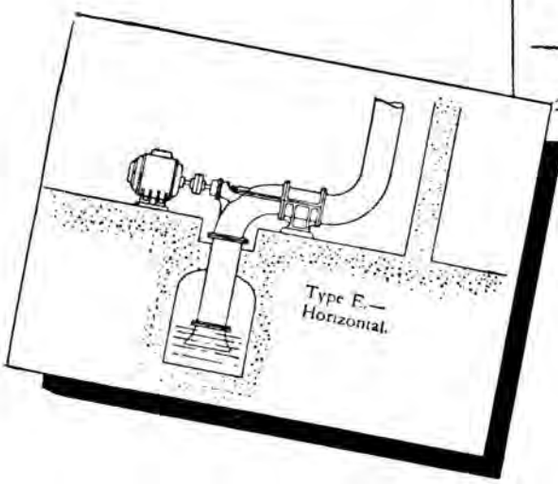
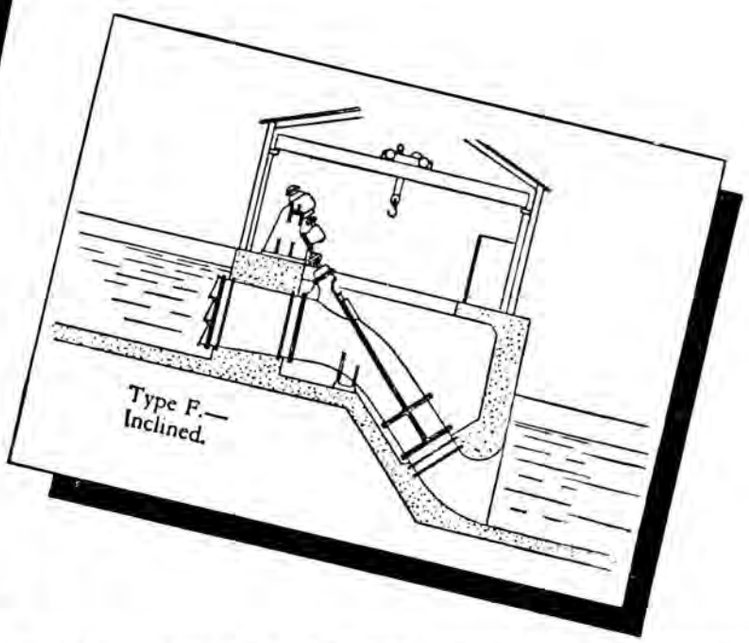
Low Lift Pumping









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These pumps are manufactured in single and multi-stage units capable of dealing with large volumes of liquid against heads up to, approximately, 60 ft. The above diagrams show a few applications designed to achieve the most economical operating conditions.

In addition to LAND DRAINAGE & IRRIGATION SCHEMES, this type of pump has been installed throughout the World for the following duties:—

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IMPORTANT FACTORS: This type of pump is entirely and inherently SELF-REGULATING, i.e., at a constant speed of revolution any fall in head below the maximum specified condition, while accompanied by an increased discharge, will result in a decreased B.H.P., thus avoiding overloading the Prime Mover.

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ECONOMICAL — as pump operates at higher speeds than those possible with Centrifugal Pumps.

HIGH EFFICIENCY — due to path of liquid flow being direct, internal losses are avoided.

NO PRIMING required when pump impeller is submerged.

Vickers-Armstrongs Limited

VICKERS HOUSE, BROADWAY, LONDON, ENGLAND.

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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.

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

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

VOLUME X • NUMBER SEVENTY • SEPTEMBER 1949

CONTENTS

The south façade of the new studios and administrative offices of the South African Broadcasting Corporation, in the Esplanade, Durban, as it will appear when the building is completed.

SOUTH AFRICAN BROADCASTING CORPORATION

NEW DURBAN STUDIOS AND ADMINISTRATIVE OFFICES

THE site which has been secured for the new Studio Building in Durban is situated with a frontage of 51′ 6″ on the Esplanade and a similar frontage on Leslie Street, a narrow cul-de-sac. The site is some 231 feet deep. Although obviously not an ideally shaped stand, on which to plan a highly complicated building, such as is required for broadcasting purposes, considerations of convenience and accessibility have played an important role in the choice of site.

Zoned Design

Basically the building has been zoned into three sections: that abutting on the Esplanade has been devoted to administrative offices; that facing Leslie Street to garages, non-European administrative accommodation, caretaker's quarters, etc., and the central portion of the building to studios, control rooms, etc.

The Durban Building By-Laws and Town Planning Regulations allow only a certain maximum area of the site to be covered by the building. To comply with this stipulation, an 8-foot passageway and area was left down the west side of the building. On the ground floor this affords exits from several fire-escapes and also from the Main Concert Hall. On the upper floor it provides natural lighting to many of the offices. The main corridor serving the studio section of the building is also situated on the west and can thus be naturally ventilated.

Air Conditioning and Access Arrangements

The whole building will be air-conditioned, both temperature and humidity being controlled. The air-conditioning plant will be accommodated in a large room situated on the roof, and will be supplemented by booster air-conditioning plants located at strategic points throughout the building. Two main ducts, each some 950 sq. ft. in cross-sectional area, will house the supply and return channels.

Two high speed passenger lifts will be installed alongside the main entrance from the Esplanade, while a further goods lift will be found near the Leslie Street entrance, which will also permit ingress and egress for Non-Europeans. Four staircases, including two fire escapes, will serve every floor of the building.

The main entrance from the Esplanade will lead into a large hall, flanked by a reception desk and commissionaires' and cloakroom accommodation. Ready access will also be provided to the Board Room and a reception room for sponsors of commercial programmes.

Another large foyer will give access to the main concert hall which will seat some 240 persons. The ancillary accommodation for the hall will consist of a band room, instrument store, artists' green rooms, and, situated on the first floor level, an announcer's studio, control room and booths from which sponsors may view performances.

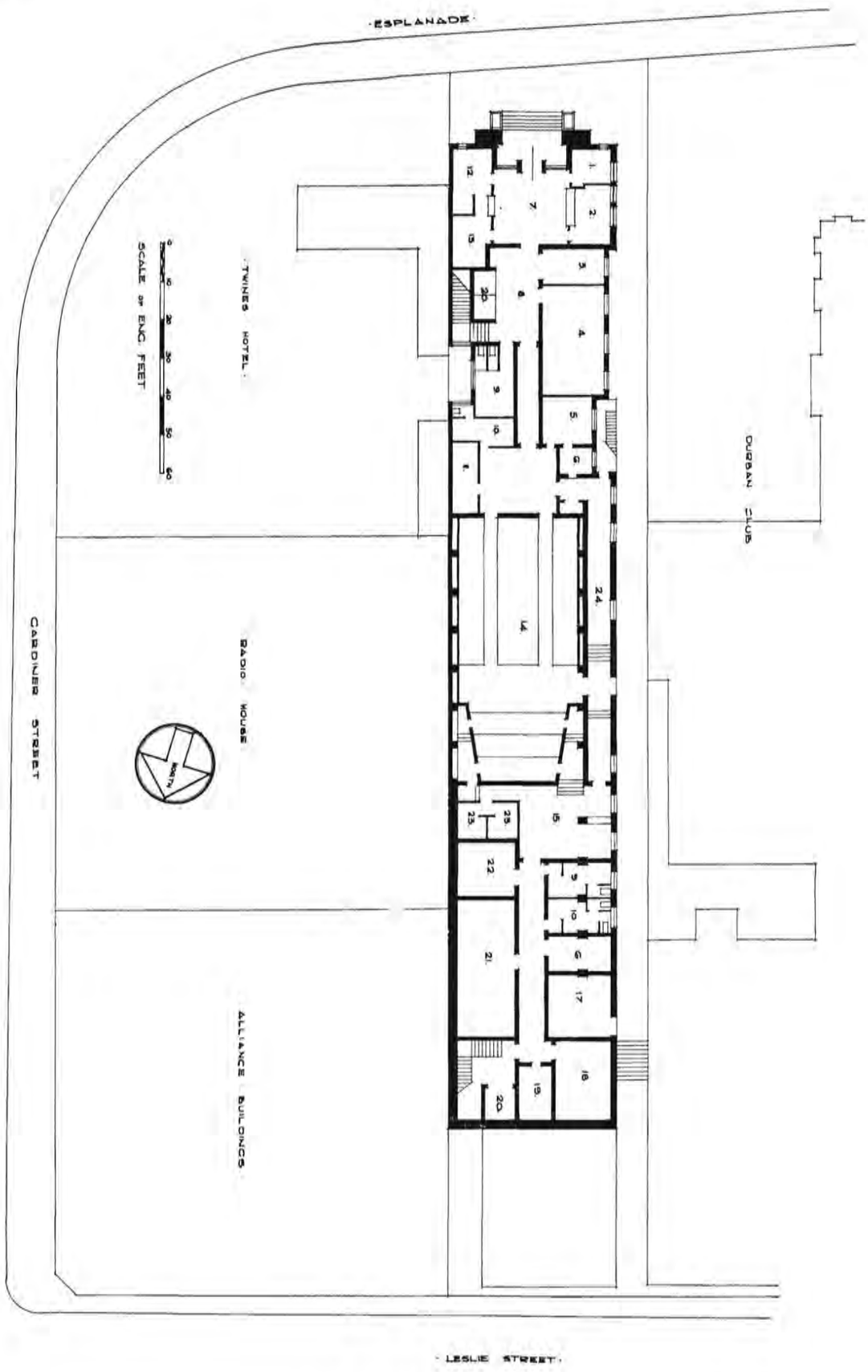
Photo: Lynn Acutt (Pty) Ltd.

A recent view of the site with the Durban Club on the left and Twine's Hotel on the right.

Layout of First Three Floors

The first floor will accommodate, in the administrative section, the Regional Director and his staff, the upper portion of the concert hall and ancillary accommodation, a small record library with compiler's rooms and, facing Leslie Street, the garages and Outside Broadcasting Department. There will also be rooms for the storage and adjustment of equipment and for battery-charging. It is essential that the garages and Outside Broadcasting Department should be closely related, in order that the bulky equipment necessary for outside broadcasts may be quickly and easily loaded into trucks.

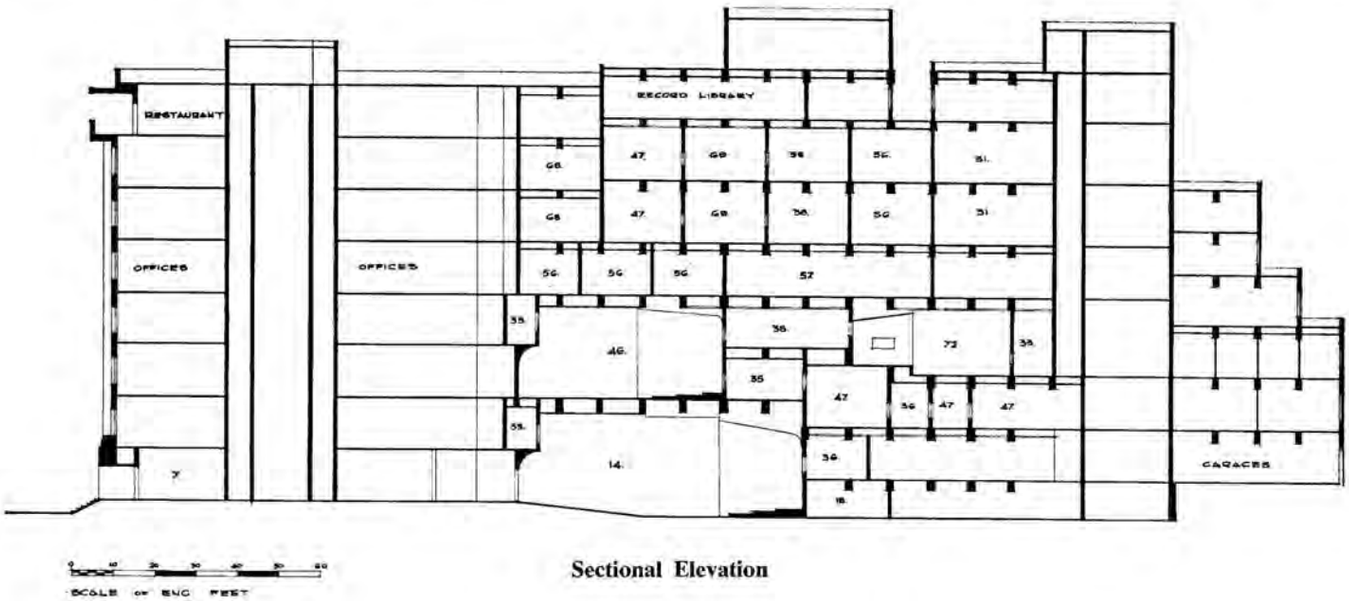
The Regional Programme office will be situated on the second floor, together with a small reference library and translators' office. In the studio section the large music studio has been planned. It will measure approximately 50 feet long by 30 feet wide and will have accommodation for



Plan of the Site

Legend

1. Telephone Switchboard.
2. Reception.
3. Waiting Room.
4. Board Room.
5. Sponsors' Reception.
6. Kitchen.
7. Entrance Hall.
8. Main Stairs.
9. Gents' Cloaks.
10. Ladies' Cloaks.
11. Air Conditioning Plant.
12. Commissionaire.
13. Cloaks.
14. Concert Hall.
15. Board Room.
16. Low Tension Room.
17. High Tension Room.
18. Archives.
19. Strong Room.
20. Lift.
21. Lumber Room.
22. Band Instrument Store.
23. Artists' Green Rooms.
24. Corridor.



Sectional Elevation

Legend

14. Concert Hall.
15. Board Room.
31. Space for future expansion.
33. Sponsor's Booths.
35. Speech Studio's.
36. Control Rooms.
38. Small Production Studio.
46. Large Music Studio.
47. Large Production Studios.
56. Continuity Suite : Speech Studio, Announcer's Studio and Control Room.
57. Main Control.
68. Audition Rooms.
69. Effects Studio.
72. Small Music Studio.

an audience as well as ancillary accommodation in the shape of sponsors' booths, control room and announcer's studio. Adjacent to it will be the large Non-European studio, together with its control room, speech and small production studios.

The large music studio will be linked on the third floor with a production group consisting of a small production studio, control room and speech studio, which will, in turn, be linked with the small music studio measuring 40 feet long and 25 feet wide. Connected in this way, each studio could be used in a group, which may be broadcasting a production involving the use of a number of studios; at the same time, each studio could be used by itself for a vocal item or a solo instrumental performance.

Visual Studio Control

The fourth floor will accommodate the Divisional Engineer and his administrative and technical staff and, in the studio section, the main control room, trunk room, recording and equipment rooms.

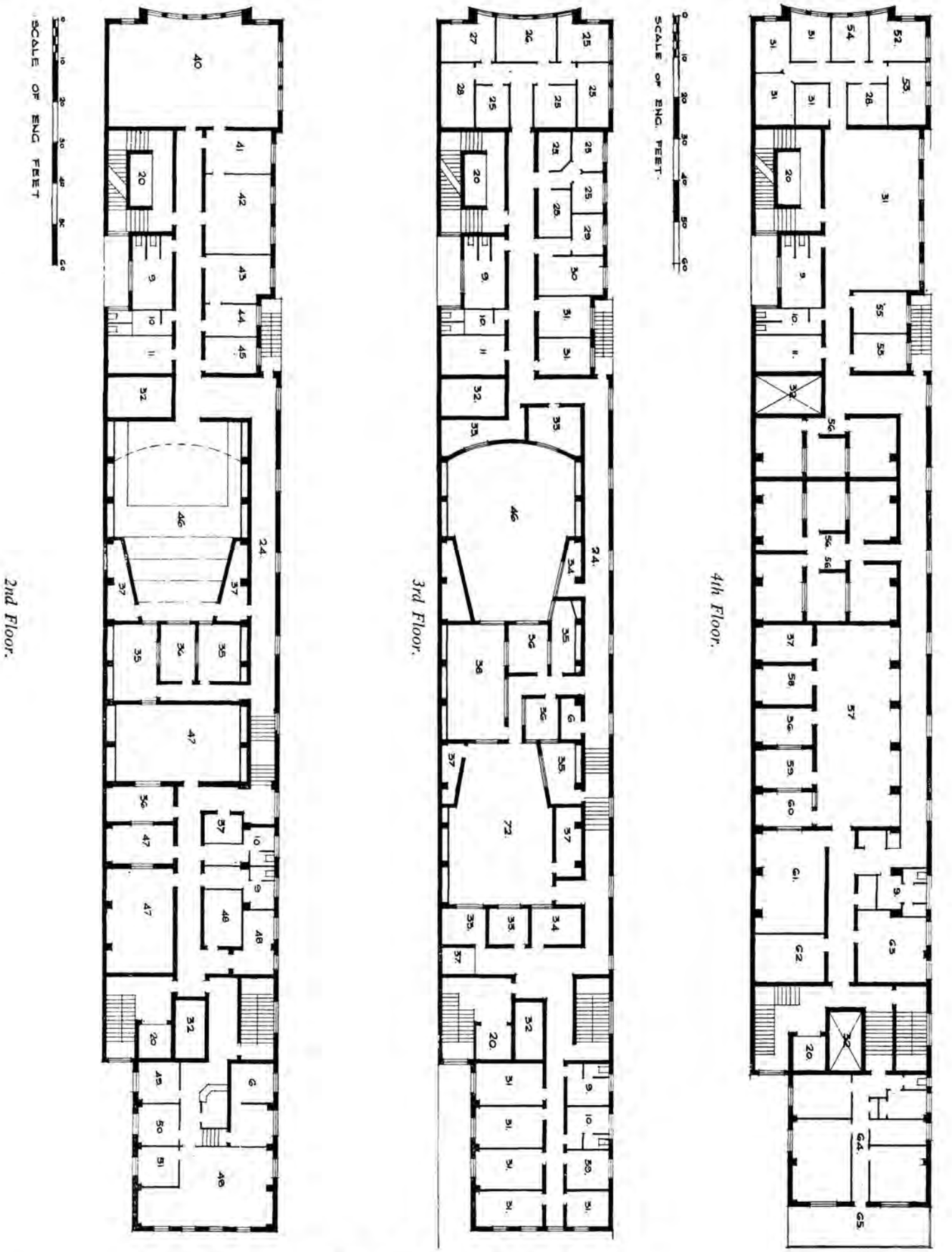
The main control room, the nerve-centre of the building, will contain equipment to amplify the small electrical impulses originating at the studio microphones and distribute them to the local and other transmitters.

The trunk room will accommodate equipment for the termination and switching of the Post Office land lines which will inter-connect the various studio and transmitter centres.

In addition, three continuity suites will be situated on this floor. A continuity suite consists of a speech and announcing studio grouped with a control room, all in visual contact with one another. Such a group maintains the continuity of a particular programme.

The control desk operator in the continuity suite control room thus can operate with vision of the announcer on duty and also in close collaboration with the record playing assistant. All the programmes broadcast on, for example, the "B" programme chain of transmitters, will, therefore, go through the "B" programme continuity suite channel of equipment. When a programme, more complex than ordinary recordings, has to be broadcast, this programme will be produced in one of the production suites and the output feed, from the production suites control desk, will be taken into the "B" programme channel through the "B" programme continuity suite control desk. Thus, as far as possible, visual control will be established in all studios, both for announcing and production, while the control desk operators could maintain the contact between production suites and continuity suites, through the special inter-communication circuits provided in the design of the equipment. The three continuity suites on the fourth floor will be used for the non-European and the commercial programmes.

Additional continuity suites are provided on the fifth and sixth floors, and will provide the channels for the "A" and "B" programmes respectively. The fifth floor will also provide all administrative and studio accommodation for the "A" programme, while the sixth floor will provide a parallel complement of accommodation for the "B" programme. The administrative accommodation will consist of offices for the programme organisers, and their assistants and executives, for programme compilers and for organisers of juvenile programmes. The studio accommodation will consist of audition rooms, which can also be used as speech or talks studios, and a production group consisting of a large produc-



Plans of the 2nd, 3rd and 4th Floors

tion studio, a small production studio, an announcer's studio, control room and effects studio.

Restaurant and Libraries

The seventh floor will contain a restaurant with kitchen and cloakroom accommodation, a music library, a large record library with offices for librarian and assistants, and a number of compilers' cubicles, in which records can be played and marked for inclusion in various programmes.

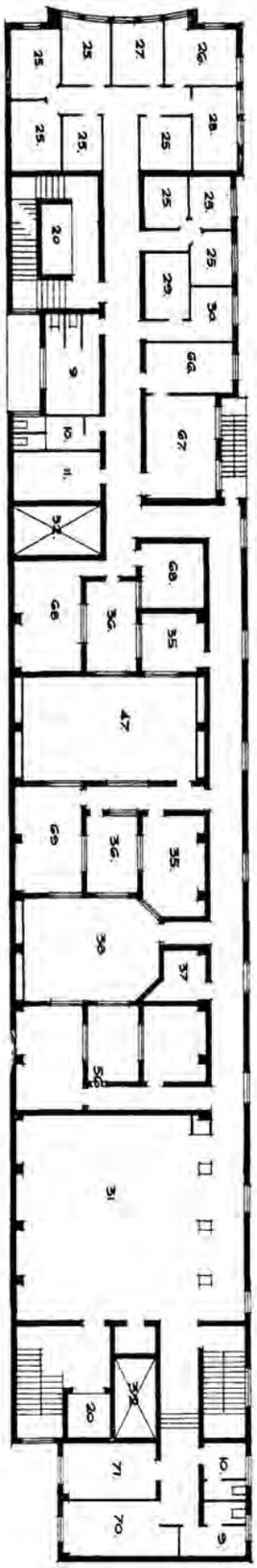
The air-conditioning plant room and lift machinery rooms will be situated on the roof.

General

It will be realised that a building such as this will be very costly. A large proportion of the cost, however, will be devoted to the soundproofing of studios one from the other and from outside noises. For this reason, if for no other, it has been essential to plan so that studios may be linked up for use in as many different ways as possible. Such flexibility of purpose also makes possible many economies in the costly technical equipment needed.

Space does not permit a detailed description of methods to be used for soundproofing. Suffice it to say, that all studios will be constructed as self-contained cubes within the general structure and physically insulated, as far as possible, from the concrete frame of the building. All studios will receive careful consideration from an acoustic point of view and, depending upon their intended use, will be acoustically "alive" or "dead."

It is estimated that the building, including technical equipment, furnishings and fittings, will cost approximately £350,000. The Corporation's Consulting Architect, Col. J. G. H. Holdgate, F.R.I.B.A., M.I.A., has prepared the sketch plans in consultation with the Corporation's Chief Engineer. The working drawings and supervision will be undertaken by Messrs. Payne and Payne of Durban.



Plan of the Fifth Floor

Legend

6. Kitchen.
9. Gents' Cloaks.
10. Ladies' Cloaks.
11. Air Conditioning Plant.
20. Lift.
24. Corridor.
25. Programme Compilers' Offices.
26. Programme Organiser.
27. Executive.
28. Secretary.
29. Assistant Juvenile Programme Organiser.
30. Juvenile Programme Organiser.
31. Space for future expansion.
32. Air Conditioning Ducts.
34. Staff Booths.
35. Speech Studios.
36. Control Room.
37. Stores.
38. Small Production Studio.
39. Bathroom.
40. Regional Programme Office.
41. Chief Woman Assistant.
42. Regional Programme Office.
43. Reference Library.
44. Translator's Office.
45. Staff Lockers.
46. Large Music Studio.
47. Large Production Studio.
48. Non-European Programme and Announcers' Office.
49. Non-European Waiting Room.
50. Non-European Programme Organiser.
51. Non-European Executive.
52. Divisional Engineer.
53. Superintendent Engineer.
54. Senior Programme Engineer
55. Control Staff.
56. Continuity Suite: Speech Studio, Announcer's Studio and Control Room.
57. Main Control.
58. Equipment Room.
59. Trunk Room.
60. Engineer in Charge.
61. Recording Room.
62. Worshops.
63. Common Room.
64. Caretaker's Flat.
65. Terrace.
66. Effects Operator.
67. Effects Store.
68. Audition Rooms.
69. Effects Studio.
70. Carpenter's Shop.
71. Cleaners' Room.
72. Small Music Studio.

UMGENI WATER SCHEME

By

H. A. SMITH, B.Sc. Hons. (Eng.), M.I.C.E., A.M.Am.S.C.E., A.M.I.Mech.E.

DURBAN'S first major waterworks were concentrated upon the Umlaas River, the limitations of which were forcibly brought to light in the severe drought of 1931, and in 1934 it was decided to consider further sources of supply. After considerable investigation it was decided to proceed with the Umgeni Water Scheme on the site, which had originally been selected in 1920 during earlier surveys, and the necessary Parliamentary authority to proceed with the scheme was obtained in 1937.

By this time it was apparent that the existing sources of supply would be unable to meet the growing demand long before relief could be obtained from the new scheme. In consequence an emergency pumping scheme was built **some seven** miles from the mouth of the Umgeni River, capable of delivering 5 million gallons per day, on a total lift of approximately 900 feet, to a purification works at Durban Heights. This could later serve a similar purpose, when water was delivered to this point from the aqueduct running from the new dam to be built at Table Mountain. Water was first produced from this emergency scheme in 1940 and in 1944 the ever growing demand necessitated its duplication to a supply of 10 million gallons per day.

The Umgeni Scheme comprises a dam and diversion works at Table Mountain, some 50 miles by road from Durban; an aqueduct 33¼ miles long, the first 28 miles length leading to the purification works at Durban Heights, and the pipe lines leading to the various service reservoirs in Durban itself.

Site Considerations

The site of the Table Mountain dam is in the Inanda Native Reserve some 14 miles from the main Durban-Pietermaritzburg road and is indicated upon the accompanying sketch, which shows the general arrangements in the vicinity of the dam.

The present capacity of the new aqueduct is 25 million gallons daily whilst it is estimated that the dam can produce a supply of 35 million gallons daily. Thus the present pipe line will later be duplicated and, when the full capacity of the dam is reached, a further storage dam is to be built some three miles upstream of the present diversion works. This will provide additional storage sufficient for a final supply of 50 million gallons daily which is estimated to be the ultimate capacity of the Umgeni River.

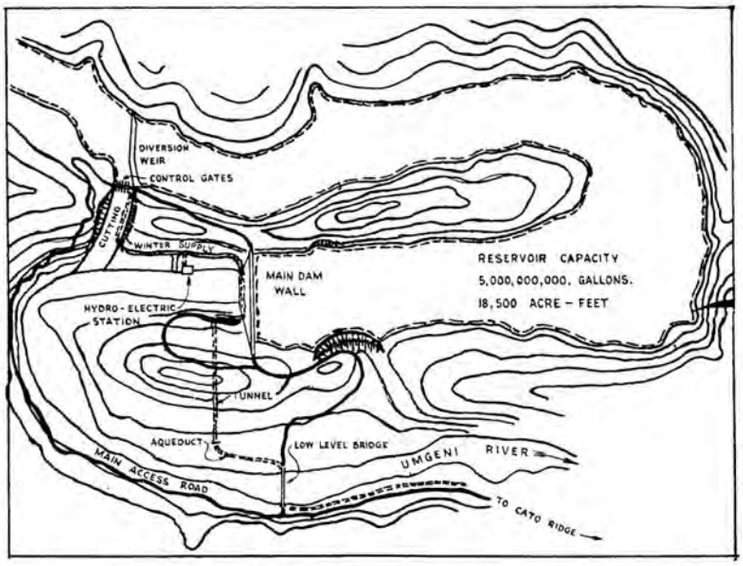
It will be seen that the site of the dam is admirably suited to diversion of the river and for dewatering the dam site for construction of the main dam, as will also be the case for the second dam. It is estimated that, at the diversion works, the river, with a catchment of 1,024 square miles, could produce a maximum flood of about 68 million gallons daily. Obviously, unless some means of diversion were incorporated in the works, silting of the dam would reach very serious proportions within a very short period. To serve the double purpose of dewatering the dam site to reduce silting in the dam diversion, works comprising a weir across the river, a regulator and a diversion cutting were incorporated in the scheme. The weir is of normal gravity suction 30 feet high above bed level whilst the regulator comprises six 30′ x 18′ sluices able to retain water to a depth of 45′ or to discharge into the cutting at the rate of 51,000 million gallons daily, so that any but a major flood can be by-passed into the river, down stream of the dam itself.

View of the dam from downstream, as it will appear when completed.

Electricity Supply

Incorporated in the diversion works is a winter supply system by which the river water, which is remarkably clean and pure, can be delivered directly into the aqueduct, with consequent saving in purification costs.

This system takes off from the diversion weir above the control gates or regulator and passes down the cutting in a 48″ R.C. pipe buried in the floor of the cutting and then returns to meet the draw-off system from the dam itself before passing into the aqueduct. En route to the dam it also supplies a penstock leading to the hydro-electric station, which has a capacity of 275 K.W. and produces power as



Sketch plan of the reservoir area, showing main dam wall, diversion weir and cutting.

a standby to the E.S.C. supply for construction purposes on the works. On completion of the construction this station will produce the necessary lighting and power for operating the flood control gates and draw-off system, along with plant incidental to the works.

Dam Construction

The dam itself is of mass-gravity type, 1,400 feet long, 147 feet from bed-level to bridge level, 169 feet from foundation level to bridge level and 98 feet wide at the base, with a spillway 400 feet long where the energy of the overfall is dissipated by means of splitters. It carries a two-lane road, which is supported over the spillway on five arches. each of 80-foot clean span, and impounds 5,000 million gallons.

It is situated generally upon fresh granite foundations, except on the extreme left flank where the rock is weathered.

Digging for and laying the pipe over the extremely rough intervening country.

Considerable difficulty was experienced with the foundations (in connection with which Dr. Kanthack and Dr. du Toit were called in as consultants) owing to the presence of fissures which necessitated special precautions in construction and a very extensive system of grouting.

Construction of the dam is being carried out under contract to the Corporation by Messrs. Dougall and Munro, Limited, who are using two cableways each of 1,800 feet span, capable of delivering the concrete in two cubic yard buckets.

Laying the Aqueduct

The aqueduct from the dam to the city is some 33¼ miles long and traverses some very awkward terrain, — particularly through the "Valley of the Thousand Hills." It comprises a series of inverted syphons running between 20 tunnels which aggregate some 9 miles in length and consists of 48″ reinforced concrete and 48″, 42″ and 36″ steel pipes over the remainder of the distance. Whilst the pipeline has a present capacity of only 25 million gallons daily, the tunnels have been built to carry the ultimate capacity of the scheme, i.e., 50 million

Photo : Stewarts and Lloyds.

The control gates structure with valve tower in diversion weir.

gallons daily, and were generally driven through granite although, at the Durban end, sandstone and quartzite were encountered.

Construction of the aqueduct necessitated the making of some 60 miles of access roads and involved some difficult pipe laying owing to the steep slopes encountered. Where conditions were reasonable, normal pipe laying methods were adopted, but on the steeper slopes the pipes were either delivered into position by inclined haulage ways or by cableway depending upon the conditions. Grades as steep as 40° were encountered with both systems. In all six cableways were erected, with spans varying from 975 feet to 1,620 feet, and with which pipes were launched out and lowered a maximum height of 400 feet to their laying position. On completion of the pipe laying on any particular section, the cableways were then used for transporting concrete for the construction of the pipe anchors, the heaviest of which weighed nearly 60 tons. The longest inclined haul, operated

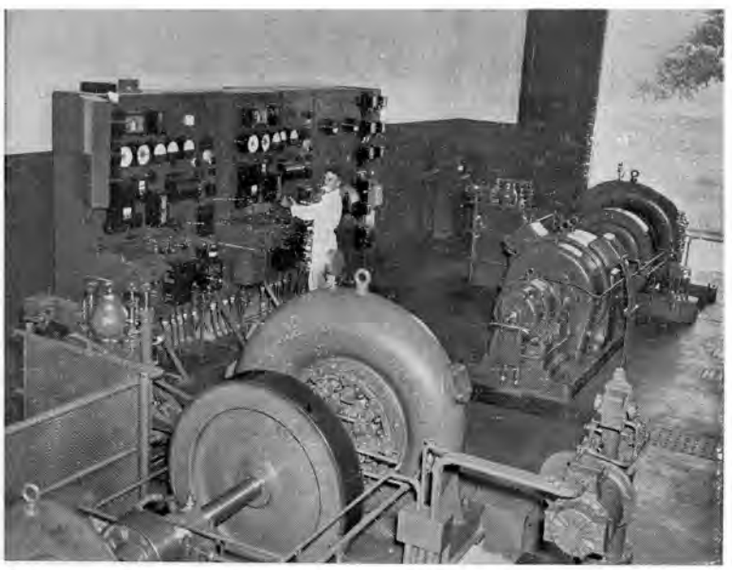
Photo: Stewarts and Lloyds.

For the first time in Africa — lowering pipes by cableway over the Umvuzana River.

in two stages, was 4,500 feet in which the pipes were lowered just over 900 feet.

The whole of the work on the aqueduct was carried out departmentally at a cost, including materials, of £1,000,000 but, to increase the speed of the work in the tunnels, bonus incentives were in operation, resulting in high rates of progress and materially increased wages to the personnel concerned.

The tunnels generally were finished 6′6″ x 6′6″, with a semi-circular roof at a grade of 1 in 1,600, but where constructed in sound rock only the sides and the invert were concrete-lined.



Interior of the hydro-electric plant.

Filtration Plant

The works at Durban Heights which are constructed on a beautiful site looking down towards the Umgeni River mouth, comprise at present four 5 million gallons daily units (20 million gallons daily) with provision for the addition of a further six similar units, the first of which will be completed in about two years time. Each unit comprises a chemical feed to flocculating tanks and sedimentation basins before the flow passes on to rapid gravity filters. From this point the water is passed over slow sand filters prior to being treated with chloramine and entering a 10 million gallon balancing reservoir for distribution to the service reservoirs in town.

The scheme, which is not yet completed, has been supplying water to Durban since November, 1948, by way of winter supply system, but it is hoped to complete the main dam in time to permit storage to be commenced early in 1950.

The main dam, nearing completion, is being constructed by Messrs. Dougall and Munro, Limited, while the diversion weir was constructed by Messrs. Roberts Construction Co., Limited. The aqueduct, purification works, the diversion works and most of the access roads were constructed departmentally.

The Durban Heights water purification works, photographed from the air.

The whole scheme has been carried out under the writer's direction, assisted by Mr. H. M. Irving, B.Sc. (Eng.), A.M., I.C.E., M.I.Struct.E., Resident Engineer, and Mr. A. Kinmont, M.I.C.E., A.M.I.Mech.E., M.T.P.I., Assistant City and Water Engineer, with Mr. L. K. Rowe, A.M.S.A.I.C.E., and Mr. C. G. G. Williams, A.M.I.C.E., on the section comprising the Durban Heights purification works and the aqueduct from these works to the city.

A special committee, under the chairmanship of Councillor W. Nagle, was appointed by the City Council to deal with every activity entailed by the project, and greatly assisted in expediting the progress of the scheme generally.

THE DEVELOPMENT OF THE IRON AND STEEL INDUSTRY IN THE UNION OF SOUTH AFRICA—WITH SPECIAL REFERENCE TO ISCOR

By DR. F. MEYER.
Chairman of Iscor.

(These extracts are produced here with acknowledgments both to the author and to the S.A. Institute of Engineers).

THE story of iron and steel in South Africa goes back into the mists of antiquity. No one knows who really smelted the first iron ore, nor where — but there is a general belief that the Continent of Africa was the birthplace of the Art . . .

Early Attempts to Manufacture Steel

About eighty-eight years ago European interest in the making of iron and steel in South Africa first commenced, when a firm of British Iron Masters made certain proposals to the Government of Natal about steel making based on the iron ore deposits at Prestwick. The Government turned the proposals down.

About ten years later, Mr. H. H. Struben tried unsuccessfully to interest President Burger of the Transvaal in the establishment of an iron and steel industry based on the titaniferous iron ores north of Pretoria. . . . But at that time, the gold industry was not yet there to consume steel, there was as yet no real coal mining industry to supply fuel as well as to require steel, nor was there a railway system which would have been at once a consumer and a service, and there was no general industrial development to consume steel.

In 1882 the Transvaal Republican Government granted a concession for production of iron and steel to A. H. Nelmapius and Samuel Marks. Both names are well remembered in the Transvaal. When the capital estimates were completed their unexpected magnitude rather stifled the enthusiasm, and again nothing emerged.

The next move is back again in Natal. At Sweetwaters, in 1901, C. H. Green built a small blast furnace which, however, failed economically. Then in 1905 "The Transvaal Iron and Steel Company" commenced the erection at Kempton Park, near Johannesburg, of a second-hand iron and steel plant bought from New Zealand, but the production stage was never reached.

The Start of Real Progress

In 1911 the Dunswart Iron and Steelworks commenced operations at Benoni and their production still plays an important part in providing the Union's steel requirements.

At Vereeniging in 1913, production of steel was commenced by the Union Steel Corporation. One of the prime movers here was again the Samuel Marks, whom we saw earlier on, interested in the concession granted by the Transvaal Government in 1882. The raw material basis of this production was the large accumulations of scrap, particularly at Railway Depots, which the Government sold to this company. To-day the same company is still contributing in great measure to the Union's requirements.

The year 1917 brings a great deal of activity. It was realised that a really strong steel industry should be based on the exploitation of our own iron ores and could not rely only on scrap. The Transvaal Blast Furnace Co., Ltd., was formed and got as far as erecting a small blast furnace at Vereeniging, but operations did not continue for very long.

Forerunner of Iscor

In the same year investigations by C. F. Delfos, of the iron ore on the Pretoria Townlands, led to the formation of the Pretoria Iron Mines Limited. Production began in a small blast furnace in 1918. Pig iron was even exported to some of our northern neighbours. This Company was then formed into the South African Iron and Steel Corporation in 1919. (The assets of this Corporation were later taken over by the present South African Iron and Steel Industrial Corporation, Limited, for short called "Iscor").

Also in 1917, J. K. Eaton commenced studies of the raw materials of Natal and of the Eastern Transvaal. As a result the Newcastle Iron and Steel Company was formed and started work on their blast furnace plant in Newcastle in 1919. That plant is still in operation to-day. For a time it became the property of the Union Steel Corporation referred to above, but to-day belongs to the African Metals Corporation, which commenced operations in 1941, and still produces pig iron at Newcastle and also various ferro-alloys at Vereeniging.

In the year 1920 the firm Geo. Stott and Company, commenced production of rolled steel products using scrap steel as their raw material. They are still successfully operating to-day.

But all these efforts so far had not led to any really substantial developments. Therefore, in 1922, the Union Government passed the so-called "Bounties Act" to encourage the manufacture of iron and steel from South African raw materials.

The "Bounties" Act

The Pretoria and the Vereeniging Companies began to take steps to establish a comprehensive plant with the assistance of this Act. It was finally agreed that one comprehensive plant would be enough to begin with, and the Pretoria concern pursued the matter, while at about the same time, the Vereeniging firm added to their activities of smelting steel from scrap at Vereeniging, by taking over the blast furnace plant of the Newcastle Company.

It was still not long after the first World War, and in spite of continuous search for private Capital, not only in the Union, but in Britain, and on the Continent — as far afield as Italy — no direct progress was made.

The matter was put before the Union Government, and after protracted debates, stretching over a few sessions of Parliament (including a joint Session of the Senate and the House of Assembly) Act No. 11 of 1928, was put on our Statute Book. This was the enabling Act under which Iscor was established. Planning and designing of the works began at once and by December, 1933, Iscor commenced production . . .

Coal Blending

The blast furnace requires as fuel a good hard non-friable coke with as low an ash content as possible. Unfortunately, only a small proportion of the known coal deposits in the Union will give such a coke when treated in the standard known coking process. And also very unfortunately, the coke from our coals have a very high ash content — it is often more than twice as high as that of good coke in Europe.

Iscor acquired a pilot plant in the Witbank area for washing coal and also for carrying out coking tests.

The purpose of washing was twofold, namely, to reduce the ash content as far as possible, and also to remove as much as possible of the non-coking portions of certain coals which did give a reasonable coke. Unfortunately, there is not sufficient difference in specific gravities of the coking portions of the coal to enable a really good separation.

As far as coal from the Transvaal is concerned, Iscor had to console itself with the fact that it is a coal which will hardly yield even moderately good coke by itself. A further solution had, therefore, to be found in mixing, or blending some of the much better coking coal from Natal with the Transvaal coal. The coking coal from Natal does give a much harder and better coke but, unfortunately, the ash content is also much higher than one could wish . . .

On this programme, although not yielding coke as good as one would like, there are known coal reserves enough to last for 60 years and more on a reasonably anticipated rate of steel output by Iscor. This was the finding recently reported by the Coal Commission appointed by the Government to enquire into the whole coking coal position of the Union . . . .

Iron Ore Resources

There is a large development of quartzitic haematite ore which continues intermittently for many miles across the Transvaal on an East-West axis. It attains one of its richest developments on the Pretoria Townlands, south of the City and on the very area which Iscor subsequently obtained as its Works Site. This ore contains, in this area, about 48 per cent. to 50 per cent. iron, the rest being mostly silica, with fortunately only low percentages of deleterious elements, e.g. phosphorous.

At Thabazimbi, about 80 miles north of Rustenburg, Iscor owns large deposits of haematite ore which in parts of the mine show large bodies of ore with up to about 66 per cent/ 68 per cent. of Fe., and fortunately also only low percentages of deleterious elements.

If a Blast Furnace operates on such a pure ore alone, the amount of slag formed is too low for reliably efficient operation. It was, therefore, a very useful procedure to mix about one part of the Pretoria ore, with the high content of silica to give slag with four parts of Thabazimbi ore. Because of the absence of long distance transportation charges, on the Pretoria ore and of low quarrying costs, this arrangement gave a happy solution of a relatively low cost ore input which also gave sufficient slag . . . .

Regarding ore reserves, I may say that Iscor has at Thabazimbi enough ore proved and in prospect, to support the present rate of production for several decades. And recently Iscor has, somewhat further afield, acquired deposits of high grade haematite ore which, together with Thabazimbi ore, would certainly last for a hundred years and more, at the present rate of consumption.

A recent aerial view of the ISCOR steel works at Pretoria.

Steel Melting Operations

Iscor started its steel manufacture according to the basic open-hearth process. After a few years the problem of a pressing demand for increased production was upon us.

A satisfactory solution was the addition to the plant of an Acid Bessemer Converter. The pig iron contains about 4 percent. of carbon which takes hours to oxidise away in the Open-hearth Furnace. In the Bessemer Converter this carbon can be burnt out in a matter of minutes giving a so-called "pre-blown metal" with practically all the carbon removed. By keeping a judicious balance between the amounts of such pre-blown metal and straight pig iron which are charged into the steel furnaces (all in the molten state) the rate of producing Basic Open-hearth steel, could be very considerably increased. This is the Duplex method of producing Open-hearth steel.

Rolling Mills

To review the very many studies that were required in the various mills would lead too far into details.

One outstanding aspect merits mention. The manufacture of sheets has so far been done according to the Staffordshire Method of hand-operated individual sheet mills which are electrically driven. The galvanising of sheets was done one sheet at a time in individual galvanising pots.

For the tonnage of sheets now contemplated this method of working is no longer competitive. Iscor is, therefore, adopting the method of continuous strip rolling of sheets with consequential changes in methods of pickling and galvanising the sheets. This plant will start going into operation during the first half of next year.

Future Trends

While not venturing to prophesy, it may be interesting to refer to a few of the directions along which much thought is being given in the Steel World to-day . . .

Two lines of research which are at present pursued with much interest and promise may be mentioned.

(i) The Pressurising of the Furnace.

(ii) Oxygen enrichment in the blast . . .

It would lead too far afield to review the various methods and adaptations involved. There is also no time to consider the many published and advertised processes of the so-called "direct-from-ore" processes, whereby it is attempted to produce steel direct from iron ore, without first smelting iron in the Blast Furnace.

The direct ore reduction processes would not be attractive in South Africa, with our rich ores, for the tonnage manufacture of commercial steel.

In any case the products of the so-called direct reduction need further processing in either a blast furnace, open-hearth or electric furnace.

There is, however, a development in hand, which promises most interesting and valuable results. This consists of blowing air or also air enriched with oxygen, into the side of the converter (instead of through the bottom, as in the orthodox converter) to impinge upon the metal bath. The main features are that we have a combination of the advantages of the Converter as regards speed of operation, and of the open-hearth as regards reliability of quality, heat consumption and ability to use larger proportions of scrap in the ordinary converter.

This process goes by the name of the "Turbo-Hearth" process. While it is still in the pilot plant stage one would venture the prediction that it is certainly a "coming process." To date the use of the side blow converter has been confined to foundries. We have been informed that in Germany large converters, basic lined, side-blown (35 tons) are being used for the manufacture of ingots. Work done in the United Kingdom with oxygen on the side blow converter shows promise.

The use of oxygen will result in higher temperatures in the vessel allowing a still greater percentage of scrap to be used.

Another interesting development is the use of oxygen in the open-hearth which has speeded up the production of low carbon steels. The oxygen is introduced into the bath by means of a lance, with its nozzle under the lag-metal line.

Oxygen is also used extensively in the arc furnace for the manufacture of stainles ssteels.

The future of oxygen in the metallurgical industry depends largely on the cost of production and the capital costs of the large tonnage plants (95 per cent. purity) envisaged.

Production Statistics

Having touched only on a few of the technical aspects of the modern Steel industry — so far as time is available — allow me to conclude with a very short summary, giving a minimum of statistics, of Iscor's present stage of development.

Iscor commenced on a designed output of about 180,000 tons per annum of ingot steel. Last year the production reached something over 615,000 tons. When the extensions at present in hand are completed, both at the Iron Ore Mine, at Thabazimbi, and at the Works at Pretoria and at Vanderbijl Park, the total ingot production will be in the order of one million tons per annum.

During the first year in 1934, Iscor employed

1,636 Europeans
and 1,174 Natives

2,810 Total

When the new extensions have been taken into operation during the first half of 1950, the number of employees will be in the order of

7,100 Europeans
and 9,700 Natives

16,800 Total

The figures, of course, include also all the Natives in the ore mines and dolomite quarries.

The total ingot tonnage produced up to date, is over six million tons.

By the end of June, 1948 (the latest date for which

(Continued at foot of next column).

published accounts are available) Iscor had supplied the country with products to a total value of £67,500,000. Out of this amount income tax absorbed something over £2,000,000, while railage bills to the South African Railways amounted to just about £6,000,000. Wages and salaries accounted for about £24,500,000 . . .

EXTENSIVE IMPROVEMENTS TO SUEZ CANAL

THE Suez Canal Company is to place a contract, probably early in August, for extensive improvements of the Canal, including a new seven-mile by-pass. Specifications have been sent to and tenders invited from a number of British, American and European contractors for the large-scale seventh programme of improvements which the company proposes to carry out within the next few years.

These works, states the company, have been rendered necessary by the all-round increase in traffic — particularly oil cargoes.

The first project is an overall deepening of the Canal by 50 cms. to allow the transit of ships with a draught of 36 ft. against the present 34 ft. This deepening will be completed in five years and will require the dredging of 7,000,000 cu. metres of sand or soil in addition to the removal of 600,000 cu. metres of rock.

New By-pass

The second project in the programme is the new by-pass canal, shown in the plan, to reduce the number and inconvenience of the passings of vessels. For, when two vessels pass in the Canal, one has to tie up to the bank. This one-way by-pass will involve 2,500,000 cu. metres of dry excavation and 11,000,000 cu. metres of dredging, to be carried out in two to three years.

The programme will be completed by deepening the tanker station in Lake Timsah from 10 to 12 metres and providing new anchorages in Port Said harbour to facilitate the formation of convoys.

Canal traffic in 1948 reached the hitherto unprecedented level of 8,686 transits and 55,081,000 net tons, exceeding by 50.6 per cent. the 1947 tonnage, which was a record.

The company's directors say that looking to the future, they may perhaps forecast that the trans-Arabia pipe-line, now under construction, and which may well be in operation by 1952, will undoubtedly reduce petroleum cargoes through the Canal. However, the prospects of petroleum production in that area are such that they may well hope that this reduction will again rise, after the opening of the pipe-line, to figures surpassing those it shows at present.

"Highways and Aerodromes."

TECHNICAL NOTES

New Control Tower at Palmietfontein

The growth of air traffic to and from the Union as well as the expansion of internal services has made the provision of further facilities necessary at Palmietfontein, South Africa's temporary international airport.

Included in the improvements recently introduced is the erection of a new control tower to replace the old tower, which was of the military type used during the war and is no longer large enough to measure up to present-day requirements.

The new tower, which is 41 ft. 6 in. high and covers an area of 21 ft. 6 in. by 21 ft. 6 in., permits of the installation of more modern equipment and the concentration of all flying services in the one building. It is constructed of steel girders covered with weather boarding and lined throughout. The building has four floors, each of which is devoted to one or other of the services necessary for the controlling of air traffic, with sufficient space for the necessary equipment.

The ground floor, with its immediate access to the flying field, houses the firemaster and the fire stores. The first floor, not yet fully equipped, is to be occupied by the meteorological section and will eventually be equipped with teleprinters and other instruments necessary for the obtaining and dissemination of meteorological data.

There are two offices on the second floor, one of which will house the Senior Air Traffic Controllers, while the other will be used by the meteorological forecasting section.

The top floor, which is completely enclosed with glass to permit of a wide range of vision in all directions, will be the control cabin. The glass windows of this cabin, which has a balcony running round the four sides, have been specially sloped inwards to eliminate any possibility of light being reflected on to aircraft either on the runways or in the air. On the table running the length of the wall facing the flying field are microphones for speech to aircraft or to the loud speakers on the aerodrome, and switchboards for the operating of the obstruction and runway lighting schemes. In the centre of the room are panel racks for the wireless transmitters and receivers, as well as the rack for the beam approach monitoring equipment while in the corner of the cabin is located the anemometer for the recording of wind velocities, etc. The anemometer mast rises to a height of from 30 to 40 feet above the roof of the cabin.

On the lawns in front of the cabin are the meteorological weather recording instruments.

The new Control Tower at Palmietfontein Air Port, erected to meet the demands of the continually rising volume of air traffic. The old control tower is shown on the right of the picture.

Metal Doors and Windows

For clarity it would be hard to beat catalogues, numbers 17 and 18, recently issued by Messrs. Crittall Hope. The former fills 64 pages with excellent drawings, description and photographs of metal windows. The latter deals with pressed metal door frames. While, no doubt, intended as propaganda, these two publications are highly informative and worth a place in any architect's or builder's library shelf.

* * * *

Automatic Stokers

The time is, undoubtedly, coming when smoke prevention and Native labour shortage will combine to make the use of automatic stokers in South Africa far more widespread than it is to-day. Twenty years ago, in the face of competition from fuel oil, automatic coal stokers were introduced into Great Britain with startling success. Whereas in 1933 there were hardly any installed, six years later they were in general use.

Among these were the Prior Mastoker, now replaced by the Prior Duplex. This is the only single-screw, double retort stoker made and numerous tests have proved, according to claims by the makers, its increased efficiency over single retort stoker. With these stokers control of air and coal feed is entirely automatic, resulting in high combustion efficiency and smoke elimination. Compared with hand-fed boilers fuel savings of from 12 to 25 per cent. has commonly been obtained.

* * * *

Washfountains

The installation of group washing equipment always presents a problem in the planning of schools, hospitals, offices and other places where large numbers of people want to wash simultaneously. The pattern, usually employed up-to-date, of rows of basins, is wasteful of space, capital cost, maintenance charges and water.

First introduced to this country in 1938, the Bradley Washfountain has already secured a considerable number of users. Among the advantages claimed for this type of group washing equipment are maximum hygiene conditions, reduction in the washing period, saving on installation and maintenance costs, an average of 70 per cent. less water consumption and saving of 25 per cent. in floor space. Apart from washfountains the Bradley Washfountain Company of S.A. (Pty.), Ltd., make multi-stall showers, soap dispensers and drinking fountains.

(Continued from next column)

to the suburban services, are connected by a large transverse hall, serving as the principal circulating area. A system of underground passages allows incoming suburban passengers to reach the three adjacent streets without conflicting with the flow of outgoing passengers.

The structure of the building is of reinforced concrete. The pavements surrounding the building are covered by an overhanging roof projected to a maximum distance of 10 metres and balanced by the weight of the indoor gallery surrounding the main entrance hall. The great weight of the 31 stories is borne by a foundation of 868 Franki piles, each of 23 in. diameter and 130 tons carrying capacity. The strong concrete floor of the lower basement serves to unite the various groups of piles and to keep out the sub-soil water. Considerable earth-moving works had to be carried out for the excavation of the basements, under the protection of sheet piling.

"Building Digest."

THE NEW RIO JANEIRO TERMINUS OF THE CENTRAL RAILWAY OF BRAZIL

THE Central Railway of Brazil has brought into service a fine new terminus in Rio de Janeiro. The first station on the site was the Dom Pedro II station, opened in 1858, which underwent several extensions and transformations in 1870, 1890, 1920 and 1930. Electrification and increasing traffic called for radical modifications not only of the services, but also of the layout of the station building. The platforms and the forecourt were in need of reconstruction, with improved circulation for passengers and luggage, restaurant and canteen facilities for passengers and employees, post and telegraph offices, bank, shops and garages. At the same time, it was desired to concentrate the headquarters of the railway company at the terminus, so it was decided to construct an entirely new terminal building.

The new station occupies a prominent site at the corner of the great Campo de Sant'Ana, adjacent to the imposing new building of the War Ministry. With its tower over 400 ft. height, it has become a new landmark of the town. To

improve the traffic conditions in the three adjacent streets, the site of the building has been considerably reduced as compared with the old station, and recourse has been had to construction in height.

The main block has two basements, ground floor and six upper floors, and is dominated by a 22-storey tower, placed in the corner nearest to the Campo de Sant'Ana. Four giant clocks, which are facing north, east, south and west respectively and can be seen all over the city, are synchronised with 50 other clocks distributed over the station premises.

The fourteen terminal platforms, ten of which are assigned

"POLITICAL, ECONOMIC AND STRATEGIC INFLUENCES UPON NATIONAL, REGIONAL AND TOWN PLANNING"

By Wm. O. BACKHOUSE, M.A.Soc., P.O., M.T.P.I.

In his extremely interesting paper, delivered at the recent annual general meeting of the Town Planning Institute (Southern African Branch), Mr. Backhouse reflected ideas gained from his tour of Europe last year. Several of his ideas may appear contentious to some, but these extracts certainly reveal a fresh approach to a number of problems important to the future development of South Africa.

After touching upon political and economic factors and their effect upon planning, the author goes on to discuss the dangers of over-concentration of industry and population as well as the extreme desirability of planned dispersal. Fittingly up-to-date, Mr. Backhouse emphasises the dangers which the Atomic Age has created for South Africa. As the range of aircraft increases so does the possibility of aerial attack, even upon this southern tip of the African continent. He concludes, after outlining some of the eventualities that might occur, with a series of suggestions addressed to the highest Government levels.

MANY of the text book theories, which look so wonderul on paper, fail in practice because in the theory too many of the factors were assumed (often wrongly), other factors were entirely ignored, and far too often accepted standards which never had a logical basis had been applied.

South Africa has a very long way to go to secure good National, Regional and Town Planning, but **within the scope of the existing legislation** I must say that it has achieved remarkable results.

Political and Economic Factors

I feel that it is necessary to warn my colleagues and fellow citizens of a danger which is often so gradual and cancerous in its growth that the full extent of its hazards is not appreciated until it has grown beyond or almost beyond control. I refer to the desires of certain political theorists, throughout the world, to substitute public ownership and public control for private ownership, individual action and private initiative. You may well say that these remarks are not related to Physical Planning, but I hope to prove that they have a profound effect upon planning, and would ask you to consider :—

(a) That what we know as our "Western Civilization" was built up on private enterprise, private initiative and a hard struggle for existence.

(b) That the Standard of Life in our Western Civilization depends upon the amount of production and consumption of goods : if nobody produces anything we have no standard of life : if everybody produces plenty we have a high standard of life.

(c) That in general human beings must have an incentive to work : take away or diminish the incentive to work and the average person will do less work.

(d) That during the last two or three decades there has been increasing organized attempts to make workers dislike their work ; accept the work of the slowest worker as the general standard ; continually to decrease hours of work and at the same time increase pay for a lower standard of work ; discourage the good efficient worker from attaining a high standard of work and to cause discontent between workers and employers.

(e) That many persons desire to bring under Public Ownership and Public Control as many industries, businesses and functions of life as possible.

(f) That Public Ownership and Control can never be as efficient as Private Enterprise for the following reasons:

(i) The private individual can do anything he likes provided it is not contrary to any legislation, whereas under Public Ownership nothing can be done unless there is enabling legislation.

(ii) Under private enterprise, private money is used and very great risks and experiments can be taken or made and, if failure results, only those participating are the losers, whereas, under public ownership the same enterprise is not possible because of the serious repercussions of failure and loss of public money.

(g) Those in control of large organizations **tend to fit men into systems rather than systems to fit men** and by so doing have far too much regard for authority and too little consideration for individual initiative. This is very noticeable in some countries where people are being "spoon-fed" and "conducted" through life from the cradle to the grave by hosts of officials who gradually sap away all spirit of individuality.

(h) In those countries the ratio of officials to other workers is as high as 1 to 8 and 1 to 9. These multitudes of officials are **Consumers** but not **Producers** and, therefore, the higher the ratio of non-Producers to Consumers, the lower the general standard of living.

(j) That usually the first step towards general Public Ownership is the nationalisation of the complete public control of the development of land. Many reasons are given for Public Ownership of land but those same reasons could equally be adapted to the Public Ownership of all essential commodities.

If a community is rich, prosperous, hard-working and efficient, the standard of housing, town development, amusement, transport, agriculture, etc., can be high. If, on the other hand, efficiency is low and the community is poor, the economy of that community will be low and their standard of living poor. Economics will not permit the settlement of the population within standards higher than their efficiency

and wealth permit; a whole community cannot be sub-economic.

Planners and Political Thought

It is very necessary that we, as Planners, should have a good advanced knowledge of what the political tendencies will be towards efficiency in the productive workers. Are they to be encouraged to take a pride in their work and to have incentive to work efficiently with the resultant better living conditions for themselves and their families, or are they to restrict output to the standard of the slowest worker, continually work less and less hours with decreasing efficiency resulting in poorer and poorer living conditions?

No section of the community can continually live at the expense of other sections without seriously affecting the community as a whole and, therefore, it is improvident for any section of the community to be housed under conditions beyond their economic worth.

In that respect it is particularly noticeable in some countries that the tendency is to create what is called **"a classless state"** in which the endeavour is to bring everybody to the same pre-determined level, except possibly certain political leaders. One method, used to achieve that aim, is to prohibit the individual from building a house and to ensure that all housing is undertaken by the Government or Local Government. This results in stereotyped housing development and is tending to the conditions that, when a person requires accommodation, he is not free to live where he likes but must accept whatever accommodation is offered by the appropriate official.

We in South Africa like to say "I want to build that particular house, on that plot in that township" and we, as a whole, would resent being told that we must live in a particular house indicated or go to the bottom of the list of applicants for accommodation. **I would strongly advocate that we cling to our spirit of individuality** and that every possible investigation is made to find ways and means to permit the individual to choose the type of house and the township in which he desires to live . . .

In many parts whole populations are suffering from frustration. People who had been free to lead their own lives were frustrated by the lack of opportunity for personal achievement and by the attempts of governments to spoon-feed them and direct their lives into narrow channels.

Industrialists' Viewpoint

Our country is now developing at a very fast rate, its prospects are very great and, moreover, its natural resources and strategic position make it necessary that we should encourage the right sort of progressive development. For our security alone we must have a contented and industrious population, financial stability and the maximum security against possible aggressors in warfare. We must encourage overseas manufacturers to manufacture their products in our country, rather than export to us from other countries.

While overseas, I met many industrialists and took every every opportunity to point out to them the advantages of transferring part of their works to our country. In some cases I hope that I was successful, but quite frequently I was informed that investigations had already been made and there were factors which were against establishing in this country.

Among those factors were :—

(a) **The housing position in the country.**

(b) **The cost of housing.**

(c) **The long delay in obtaining permission to establish a township.**

(d) **The lack of suitable industrial sites.**

(e) **The impossibility of being able to calculate the liabilities and costs of laying out a township.**

(f) **Transportation costs by railway and the restrictions upon the use of road transport.**

There appeared to be considerable keenness to establish in our country, but it was pointed out to me that, in industry, you must be able to estimate your cost structure and there were certain factors here which could not be calculated. Also, if they desired to lay out their own Industrial and Residential Townships, it would take anything from two to four years to finalize the procedure and until then there would be considerable risks in commencing development.

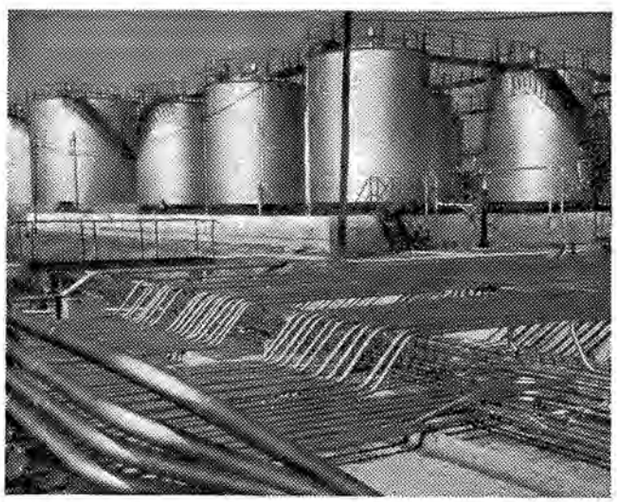
We, in South Africa, have a country which must develop. We have natural resources and strategic bases which are the envy of many nations . . . .

Both Public and Private enterprise has its advantages and disadvantages and it is desirable that in the development of our country we adopt the best from both these systems . . .

Planners must Co-ordinate

No Planner can be an expert in all the details of the many functions for which he has to plan. It is therefore necessary that he shall work and plan in consultation with all the varying interests concerned. Industrialists are intimately concerned with the correct location of industrial sites; their sizes and shapes, means of communication and transport; access to markets; water and power supplies; sources of fuel; disposal of trade wastes; housing of employees, etc. During my year of office I want to set up a joint committee of the Town Planning Institute and the Chambers of Industries, to discuss all relevant matters . . . I also would like our Institute to meet the Chambers of Commerce and the Property and Land Owners so that it is possible to plan with their consent. . .

Under our rating system, which is based primarily on land values, the plots which have little or no development, and little chance of development, must be rated at the same value as the adjacent plots which are developed up to the maximum permitted under a Town Planning Scheme. In addition such matters as planning for particular uses, traffic, control of



The new chemicals-from-oil plant recently opened at Stanlow in Cheshire.

density of population, parking of motor vehicles, loading and off-loading of merchandise, etc., should be mutually considered. It will be seen that there must be close co-operation between the planners and the business interests and property owners . . .

. . . I would ask that we, as a profession, realize that we are planning for the people, who have every chance of objecting to our proposals and it is not for us to force our theories on to the population, but for us to let the population understand and appreciate the advantage of our knowledge and then for us to give them the Schemes which they desire . . .

. . . . I would ask the Press, public and private bodies, the Chambers of Industries and of Commerce, the Trade Unions, the Property Owners and the general public to take an intelligent interest in National, Regional and Town Planning.

Conditions of Planning in South Africa

. . . . some good work has been done in the planning of parts of the country within the scope of the existing legislation. There are many aspects of National, Regional and Town Planning which cannot be considered under the legislation of a Provincial Council and for which direction from the Union Government is necessary.

These aspects include :—

(a) **the concentration of large proportions of the population at the four main ports, on the Witwatersrand and at Pretoria.**

(b) **The direction of new industries to the smaller towns which have possibilities of independent water supplies.**

(c) **The mass migration of Non-Europeans to the larger towns.**

(d) **The strategic necessity for greater dispersal instead of concentration of population and industry.**

(e) **The desirability of encouraging multi-industrial towns as against mono-industrial towns.**

(f) **The conservation and best use of the water supplies**

A very serious aspect of the Town Planning Control and the control of New Townships in the country is the fact that each town or township is considered only within its own boundaries and is not considered on a National or Regional basis . . . .

An important aspect of the overzoning for industrial development, especially by Local Authorities, is that considerable sums of Public money are spent, by each Local Authority, on the development of the Industrial Townships, each trying to compete with others to attract industries by offering more favourable conditions. The result of this overzoning will be to create many white elephants and a considerable loss of public money.

Easier Township Development Essential

Coming now to the laying out of townships by private persons of companies, there is much to be said against the present tendency. In the "good old days" any owner of land could sub-divide into township plots and sell without any obligations to the purchasers or the public. Huge fortunes were then made and the public had to pay for all amenities in the townships. Those days have now passed and the pendulum has swung to the other extreme. So much so that it is now impossible to calculate the costs and the profits or losses of township development. This can only result in the lop-sided development of our towns; the indirect socialization of land within Municipal Areas and the further inflation in the cost of township plots left.

To give an indication of what I mean : the owner of land decides to lay out a township; application is made to the Townships Board and it is advertised; Local Authorities, Government Departments and Public Bodies crowd round like hungry wolves to grab all they can, even when they have no need for any land they ask for it "for bargaining purposes."

The standard of road construction; the supply of water; power and sanitary services; the provision of an ever increasing payment of endowment and the Conditions of Establishment, which get more and more severe, are loading the costs of the plots beyond the economic limits of the masses of the people and making it financially impossible for anyone except the largest financial institutions to develop townships.

Each of these costs is necessarily loaded on to the cost of the township plots and the township owner must, in addition, cover this capital outlay by also adding interest of at least 5% on these capital works. All this, in turn, increases the endowment which also has to be passed on to the plot purchaser. In most cases plots are purchased on a deferred payment system and interest at 5% is charged. It will be appreciated that the accumulation of interest upon capital and interest is putting a further and further burden on the cost of plots to the extent that building plots are about three times the reasonable cost.

Reducing Land Costs

I submit that there is a way to bring down the cost of building plots to a level at which the average citizen could buy. Local Authorities can raise money at a much lower rate of interest than the average private person and it is suggested that Local Authorities put in all the services, zone by zone, in townships and impose a special rate, spread over say twenty years on each plot holder, the rate to be based upon the proportion of the cost of services. By this method the plot holder would only have to purchase the actual land and would then pay a special rate to cover interest and redemption charges on all the services. Another advantage of this method would be that many more owners could develop townships and with the competition for sales, the price would fall. Even the largest financial institutions are now finding it impossible to estimate the liabilities of township development and are withdrawing applications when they see the terms upon which the establishment will be permitted. This inflated cost of land is causing masses of the people to reside in flats, boarding houses and sharing dwelling houses with the result that our ideal of "Family Life and the Family Unit" is being destroyed.

Not only is the price of the land increased by these requirements but a valuator for rating purposes must rate land on its market value and the market value includes all the expenses for provision of services, endowment, interest on developer's capital, etc., all of which put an increasing burden on the purchaser of land in a new township . . .

Over-Concentration of Population

It would be interesting to see maps shewing the European and non-European Residential Townships and the Industrial Townships approved and proposed within a radius of twenty miles of our big towns. Such maps would shew the enormous concentration of population and industry which has been permitted in extremely limited areas of the Union. If full development of these many townships ever did take place, it is doubtful whether they could ever be supplied with the services of water and efficient transport.

This concentration of industrial development in a few areas has caused hordes of non-Europeans to flock to those

areas, thereby creating considerable difficulties in finding suitable areas for them to reside and in providing them with houses. From the points of view of the non-European and the European, and the well-being and the security of the country, a policy of dispersal of industry and population is necessary.

There are many towns and areas in the country which are capable of developing good water supplies; which have rich mineral deposits and which must be considered as future industrial centres of the Union. Two outstanding examples of such towns are Newcastle, with its independent water supply from the Incandu River, and Piet Retief, which is based on the Assegai River . . .

Need for Dispersal

The Social and Economic Planning Council and many other bodies and persons have advocated dispersal and in the next part of this paper under "The Strategic Aspect," I hope to prove that it is imperative that Dispersal of Industry, under direction, should be planned. A considerable advantage of the dispersal of industry would be the more even distribution of the non-European population; to the advantage of themselves and to the country. Union Government legislation and the guidance of the Government, the Chambers of Industry and the planning authorities would be necessary for the direction of new industries to dispersed centres. If legislation is forthcoming, it is desirable that powers be granted to make Planning Schemes and Conditions of Title much more flexible and much more easily adaptable to changing conditions and to speed up and make more economic the development of townships.

There is a growing realization throughout the world that a country is not economically or strategically safe if it cannot provide the essential foods for its population within its boundaries. The days when a country could carry a large population, import raw materials and manufacture goods for export, and with the profits of that export buy the very foods to feed its population from other countries, have gone. Also the days when certain countries could concentrate industry for export trade without strategic considerations have gone.

Many of the industrialists in countries where industry has been concentrated, realize that dispersal of a nucleus of their plant to other parts of the world is necessary. With the recent application of Import Control (with its restrictions on the South African market from other countries) and the strategic necessity for dispersal, it can reasonably be anticipated that our country is on the verge of considerable Industrial Development. If I am correct in that assumption, there is little time to spare in preparing schemes for the towns which will provide sites and services for the influx of industries and I would ask the Government, the Chambers of Industries, in conjunction with our Institute, to give very early consideration to the best methods of assisting the smaller towns to develop and to the guidance and direction of industries to the most desirable locations.

The indications are that new industries will tend to be located along the Reef and at the four main ports unless very favourable conditions can be offered by the smaller towns of the Union, and for that reason early consideration must be given to the development of Water Supplies, Economic Transportation Services, and Planning of the smaller towns . . .

Influences of Strategy and Defence

Planning for Defence is no new function of planning. The earliest planning recorded in history was essentially planning for defence. This important aspect of planning was a governing function until the Industrial Revolution of the last century. Since then, with the advent of war by bombing, flying missiles and atomic contamination, the strategic and defence aspects have returned as the most important influences in planning. The historic planning for defence consisted of developing small, concentrated communities within walled cities, where possible, with a river barrier on at least one side.

The modern planning for defence is the avoidance of large concentrations of population, industry, transport junctions, large regional water supplies, etc., and a general dispersal into smaller groups, each with independent essential services and good lines of communication . . . .

In our generation we have been engaged in two world wars — wars which were to end wars, and now we find that greater problems face the world than ever before.

Among the many factors which make war more than possible, I will mention :—

(a) **Political Ideologies.**

(b) **The distribution of the World Population, with the necessity for some people to secure living space, food and work.**

(c) **The fight for world markets.**

(d) **The world distribution of Natural Resources and Strategic Bases.**

(e) **The fear of strong nations that weaker nations are gaining in strength and scientific advancement.**

I sincerely hope that this important aspect of planning **will be considered at the highest Government levels now** and I regret that up till recently there have been no indications of such a step . . . .

Effects of the Atomic Age

While little is known, except by certain scientists and high defence personnel, about the effects and possibilities of atomic radiation, I understand that ports and large regional water supplies are considered extremely vulnerable . . . .

There is a great difference between atomic warfare and normal explosive warfare in that the radiation effects of atomic energy last for many months. There is another aspect, the cost of producing an atomic bomb is very high, and it is unlikely that atomic bombs will be used except against very important targets.

Considerable study of security and Defence Planning has been undertaken in the U.S.A. by the National Security Resources Board and I will quote from their report "National Security Factors in Industrial Location" :—

"There is no known military defence against the atomic bomb itself, except space. There is and will continue to be defence against any carrier which a potential enemy might use to deliver such a bomb. This defense alone is not sufficient.

"The constantly increasing range of aircraft, together with the enormous destructive capacity of atomic weapons, makes it reasonable to assume that within the forseeable future no area in the United States will be immune from possible attack because of its location alone. This assumption, coupled with the knowledge that the destruction or immobilization of a nation's vital industry will destroy its capacity to defend itself, makes it reasonable to assume that highly concentrated areas of vital industry and population will be the most attractive targets.

"The risk of a sneak or unconventional attack becomes great because of the formidable and possibly decisive advantage which would accrue to a powerful enemy in modern warfare by choosing the time, place and mode of attack. Sabotage and other methods of destruction would probably be attempted in an effort to prevent effective industrial mobilization for retaliation. Atomic bombs could be delivered simultaneously by plane against strategic industrial targets and by ship against our vulnerable ports."

Picture a map of our country and imagine the coast line of over 3,000 miles, South West Africa, the Cape Coast and the Natal Coast. Imagine our four Ports (the gateways to our country); those ports are developing into shipping gateways; Naval Bases, vast Industrial Areas and concentrations of population. Imagine the inland towns of our country; we have many small towns which are almost stagnant in their growth; we have the Witwatersrand, Pretoria, Vereeniging and Vanderbijl Park; we have the fast developing areas of the Orange Free State Gold Fields.

Attack by Atomic Contamination

Having fixed these development areas in our minds and the distances between them; the whole expanse of the country and the concentrations of Population, Industry and National Assets which they represent, I want you to imagine the effect upon the country if those districts were paralysed by atomic contamination. Our assets are so concentrated and so dependent upon regional supplies, it would appear that atomic contamination in a relative few places could paralyse the country . . .

It would appear that the most probable methods of attacking concentrated populations would be to contaminate the water supplies, harbour waters, road and railway junctions. If there is a danger of atomic contamination of say the waters of the Vaal Dam, this would affect about one-fifth of the population of the Union. The population (excluding Pretoria and the O.F.S. Goldfields areas) which is dependent upon the waters of the Vaal Dam, is recorded to be 2,102,000. Imagine the effect, upon the country as a whole over an extended period of months, of such contamination.

Undoubtedly the contamination would be detected before there was much destruction of human life; the population would have to be evacuated to reception areas, the colossal industrial development of the region would be brought to a standstill and considerable difficulties would be encountered in recovering essential materials and foods.

In addition to the contamination of the waters of the Vaal Dam, imagine atomic contamination of our four main ports with their functions as shipping gateways and their vast industrial developments. Under such conditions, with our four main ports and the Witwatersrand Region out of action and uninhabitable, whither could the populations be evacuated? We have no reception areas to which a population could be evacuated because, owing to the lack of development, the smaller towns have not provided essential services greater than their immediate requirements.

It is advocated that conservation of water should, where possible, be by many small dams, so designed that they are off-shoots of the supply stream and can be disconnected and isolated from it when necessary. I have already mentioned the possibilities of Newcastle and Piet Retief as very desirable development areas for the dispersal of industry and population. These two towns are situate on perennial rivers and might well be planned as development and wartime reception areas. There are many other towns in the Eastern Transvaal, Northern Natal and other parts of the country which could be considered for similar development.

Strategic Planning

In a paper of this nature it is impossible for me to do more than skirt the very fringe of the important subject of Strategic Planning . . .

While I cannot go very fully into this aspect, I will list **a few of the important considerations:**

(a) **Planning of Reception Towns together with their essential services, industries, accommodation, etc.**

(b) **Planning more ports and the necessary road and rail communications.**

(c) **Planning alternative road and rail communications.**

(d) **Planning storage for foods and essential materials.**

(e) **Tunnelling roads through hills to assist in forming protective shelters for the population and storage areas.**

(f) **Housing the population in low density areas and not in concentrated multi-family dwellings.**

Advantages of Dispersal

I feel that I have said sufficient to emphasize the "Black Side" of this question and will now turn to the redeeming features. The necessity of planning for dispersal, from the strategic aspect alone, is sufficient to make it necessary for the Government to give a lead and direction, but there are so many other advantages, quite apart from Defence, that make it a pleasant duty of a Government to plan for dispersal instead of concentration. **Planning for dispersal would do much to counteract the migration of non-Europeans to the few large centres by ensuring a more even spread throughout the country.**

Taking all factors into consideration, I consider that development of a Parent Town with a population of 100,000, surrounded by Regional Satellites to make a Regional Population of anything up to 250,000 desirable.

Suggested Action

It is strongly recommended that the Government, immediately, sets up a Commission of Inquiry to consider:—

(a) **The effects of the existing legislation and general conditions upon the development of the country.**

(b) **The factors which induce concentration of industry and population and the extent of such concentration.**

(c) **The factors which tend to prevent dispersal.**

(d) **The strategic disabilities of concentration of vast populations in a few limited areas and their dependence upon large Regional Water Supplies, etc.**

(e) **The most suitable areas to be planned for dispersal of industry and population.**

(f) **The methods to induce and direct the development of suitable dispersal areas.**

(g) **The best ways of obtaining the co-operation of the various interests affected by planning.**

I would ask the Government to recognise the Southern African Branch of the Town Planning Institute as the appropriate body for consultation and assistance in all work connected with National, Regional and Town Planning.

NEW PROJECTS

Alberton : Municipal clinic — to include a dental clinic and the Municipal Health Department. Estimated cost, £12,000.

Athlone : Sub-economic housing scheme for Coloured people at Q Town. Estimated cost of 106 houses, £106,000.

Bellville : New wing to be added to the municipal offices. This is to include the engineers' department and offices for the building inspector and superintendent of works as well as more accommodation for increased office staff.

De Aar : New Burgerville water scheme. Estimated cost, £150,000.

Durban : Renovating of Amphitheatre, including the relaying of the existing floor and complete re-decoration of colonnade and bandstand. Estimated cost, £2,460.
Establishment of Native Women's Hostel at Till's Quarry, Mayville.

Goodwood : Sewerage scheme. Estimated cost, £300,000.

Humewood : Development scheme for Humewood and King's Beach include the building of a bathing house, cafe and shops. Estimated cost of these, £70,000. A dance floor, beach manager's house and other improvements will cost £4,100.

Kimberley : Establishment of a wholesale market.
New Fire Station together with a modern alarm system, costing £5,000, suitably equipped drill ground with tarred surface, drill tower and all new equipment.

Lady Selborne : Police station ; estimated cost, £3,000.

Lusaka : Plans for an improvement of the water supply include sewerage and drainage schemes estimated at about £400,000.

Pinelands : Non-European housing scheme for employees of the municipality.

Pretoria : Three new reservoirs, each capable of holding 5,000,000 gallons of water.
Reticulation scheme for Hercules, estimated cost, £225,000.
Proposed reservoir at Waterkloof will cost about £54,000.

Randfontein : Sewerage scheme ; estimated cost, £330,000.

Salisbury (Rhodesia) : Construction of an "earth-rockfill" dam at Hunyani Poort.

Selukwe (Rhodesia) : Construction of a dam.

Uitenhage : Projects include the erection of a new municipal office block (£32,000), market hall extensions (£4,800) and electricity, water and road services, making a total of £348,830.
Sub-economic European housing scheme. Estimated cost, £55,000.
Construction of roads and other services at Conry Township. Estimated cost, £4,007.

Worcester: Water and sewerage scheme including the modernisation of the Sewage Disposal Works. Estimated cost, £5,000 and, Water Augmentation scheme at Stettynskloof ; estimated cost, £718,000.
European Emergency Housing Scheme, Municipal Plantation, £1,250.
Construction of cricket pitch. £350.

The Congella Power Station, with the second of the new 300 ft. high chimneys erected. Work is now proceeding on the electrostatic precipitators, in order to eliminate the long-standing dust nuisance.

PUBLICATIONS RECEIVED

The Rand-Pretoria Directory, published by the Cape Times, Ltd. 1,958 pp. £3 10s. 0d.

Well printed and indexed this directory makes its annual appearance once again. The information is, as usual, both comprehensive and up-to-date. The Administrative and Legislative section gives not only the names of members of both Parliament and Provincial Councils, but also senior members of the governmental staff in their various departments. Preceding the directories for each town are the names of Councillors and senior municipal officials.

This general information is followed by alphabetical and trade directories, with names of post box renters as well as registered telegraphic addresses of all Reef towns. Similar, though naturally larger, sections follow for Johannesburg and Pretoria. The Johannesburg alphabetical section alone covers more than 660 pages and the street section nearly 300 pages. A similar street directory is given for Pretoria. To architects and others concerned with the building industry, the complete classified lists of trades and professions must prove of great value, especially where the individual concerned is situated far from the districts actually covered. It may often be particularly advantageous to be able to discover and contact a local contractor in some special branch of the building industry. In such emergencies this directory can serve an extremely useful purpose.

Cape Times South African Directory, published by the Cape Times, Ltd. 2,823 pp. £3 10s. 0d.

This carefully compiled and comprehensive directory is well produced and indexed. The Cape Province section, including the Transkei, East Griqualand, Pondoland, Tembuland and South-West Africa, comprises a full directory not only of profession and businesses, but also of private residents and farmers. The remainder, which covers Natal, Transvaal and the Orange Free State as well as Swaziland, the two Rhodesias, Portuguese East and West Africa, Elisabethville, in the Congo, and Nyasaland, is commercial only in its scope, giving the names of professional and business people alone. There is a specially useful legal section giving the names and post office box numbers of all attorneys, notaries and conveyancers, throughout the Union. If you want to discover who are the largest reinforced concrete merchants in Bulawayo or the names of the two builders at Okahandja in South-West Africa, to take two examples at random, this directory will give you the information right away.

Altogether there is a wealth of information here to which one may very likely want to refer from time to time. Nobody can store all the facts they need in their head but it is most useful to have, at hand, much of the information you may need in easily discoverable form. Properly used, there is a mass of facts in this very solid-looking volume.

Division of Meteorology, Report for the year 1943. Published by the Government Printer, Pretoria. 216 pp. 5s. 6d.

If the question was asked what was the most important cardinal feature in the life of South Africa, surely the answer must be "Its climate." There are several claimants, of course, for the position. The gold mines, coal deposits, European and non-European labour force, the transport system, water and agriculture. These are in no conceivable order of importance, but the mere listing of these assets does indicate the utter dependence of them all upon the climate of the Union, and, as year succeeds to year, we see, with unfailing regularity, the prime importance of rainfall.

From Nyasaland to the Cape this year has brought more than its usual quota of droughts. The vital import of regular rainfall in sufficient quantities, the proper storage of water in the catchment areas and its distribution, thence to the centres of population, industry and mining, is basic to the continuance of civilised life in Southern Africa.

And, in the face of all these facts we are now faced with meagre, insufficient data about this fundamental question — six years too late. These 200 and odd pages are mere history and very dully dressed up at that. There may be some reasons — they could scarcely be good ones — for the delay and the poor presentation. No doubt lack of staff and means accounts for much. But are such excuses sufficient?

Surely what is wanted by agriculturists, soil conservation experts, industrialists, town planners, aircraft companies and others to whom accurate and up-to-date information about rainfall and climate is essential, is something much wider in scope than is provided by this report. True, there is a Union rainfall map included — for the year 1943. There are also over 200 pages of painstakingly compiled figures which, it is suggested, represent largely wasted efforts.

If a meteorological report is to be of real service it must be right up-to-date. By June of this year, at latest, we ought to know all the climatic facts about last year, for instance. More than that, data must be provided which may enable the people concerned to make intelligent forecasts of future seasons. Charts, detailed maps of regions and trends over a period of years are all necessary for this purpose. There is reason to suppose that there is a periodicity in weather performance. Only by a study of climate and weather, over a number of years, can any sound judgment be reached even by experts, as to future rainfall incidence. Some may remember Buchan's remarkable weather forecasts, based purely upon a study of the previous statistical trends.

In view of the cardinal importance of this one topic to the whole life of South Africa, may it be suggested to the authorities that steps should be taken, on these lines, to improve and publish promptly the future reports of this key department? Without the climatic facts, maybe, we shall, eventually, founder.

Report of the Department of Public Health for the year ended 30th June, 1947. Published by the Government Printer, Pretoria. 85 pp. 6s.

This is a valuable, well documented, factual report, though it is a pity that it relates only to the year before last. Of the seven chapters, one deals with housing, slum elimination and rural and peri-urban health conditions. Another has a considerable section devoted to hospital services of various kinds.

In the introduction the Report states: "The Union can claim that notwithstanding the presence of a large illiterate

and economically depressed non-European population, the public health system established a quarter of a century ago, has been successful in its main purpose of preventing and suppressing outbreaks of infectious disease. And yet, as in other countries, it has been found that despite effective control of infectious diseases there still remains a vast amount of other kinds of sickness."

Later in the same part of the Report it is stated: "Despite their magnitude, curative services are still very inadequate particularly among non-Europeans. For example, it has been authoritatively estimated that in Durban there is already one bed for every 73 of the Native population, and yet the hospitals are continuously over-crowded . . . the significance of the foregoing figure is that there is a far greater volume of ill-health among the Native population than is normal among peoples living at the ordinary levels of civilisation."

When outlining, on page 10, the authorised establishment of the Division of Nutrition and Health Education, the remark is made: "In common with the activities of the Department of Health in other spheres, lack of personnel limits the services which can be undertaken by the Division. The greatest difficulty is being experienced in securing suitably qualified personnel to fill the various posts on the existing establishments."

From the table, showing the effect of the Housing Act of 1920, it would appear that within the 27 years from its promulgation till mid-1947, nearly 75,000 houses had been completed, were under construction or were approved but not yet started. This represents an annual average, for both Europeans and non-Europeans, of slightly under 2,800 houses built per year under four classes of loan. Dwellings for non-Europeans alone during the period totalled 56,700, or about 2,100 (three-quarters) of the annual average.

In their comments on tuberculosis among non-Europeans, the Department say: "Firstly, it is essential in South Africa that adequate housing and recreational facilities be provided for all non-European urban dwellers . . . all sections of the community should be able to obtain pure water, adequate sewage disposal and all the other benefits of proper sanitary health measures. Thirdly, it is imperative that all sections of the community, but especially the urban non-European worker, be provided with sufficient and proper food to maintain health."

It is clear, from remarks made in the Report regarding hospital services, that more hospitals are badly needed. Specific reference in this connection is made to the inadequate accommodation for maternity cases and to lack of both convalescent and chronic sick homes for all races and sections of the community. Mention is also made of the need for trained nursing staff in tuberculosis hospitals. It would be revealing if future issues of this Annual Report could give a clasified and geographical list of hospitals and beds available, together with statistical data as to the extent of the staff shortage mentioned. An indication as to future hospital building plans would also be of interest.

Final Report of the Road Safety Mission. Published by the Government Printer, Pretoria. English and Afrikaans. 137 pp. 3s. 6d.

This report arrived almost concurrently with an account of the first ordinary meeting of the Council of the National Road Safety Organisation of South Africa. The report itself is divided into five sections. The first three relate to the formation of a national organisation to foster road safety; to road safety education in schools and to enforce measures. The fourth section concerns engineering as affecting road safety. In the last, general section are to be found recommendations to set up a Road Safety Research Organisation and also an institution for the training of government, provincial, municipal and other officials in traffic engineering as well as cognate subjects.

In the second chapter of the fourth section, entitled "Large-scale engineering projects in the larger cities of the Union," some reference is made to town planning. But it is doubtful whether it receives the full attention it deserves. Different chapters deal with level crossings, the segregation of bicycle traffic, by-passing of urban areas, parking of motor vehicles and sign-posting. While, rightly, much space is devoted to such questions, in relation to accident prevention, as the driver, his vehicle and measures to be taken by municipal traffic departments, there does not appear to be any comprehensive statement as to the importance of town planning, nor indeed the influence of architectural design upon traffic problems. Yet this is where much of the trouble may start.

If town planning had been invented when Cape Town, Johannesburg and some of our other cities were being built, narrow streets, traffic "bottlenecks", lack of parking facilities and some of the other evils leading to accidents might have been largely mitigated. This report does not list the bodies or persons consulted in this country, but from those seen abroad it does not appear that the Commission had any direct contact, anywhere, with town planners. While, among the 80 bodies whom the Government have invited to participate on the Council of the National Road Safety Organisation the Institute of South African Architects does, fortunately, appear, there is no mention of the Town Planning Institute — a body at least as important in this matter as the Salvation Army and the Methodist Church. Nor, although Colonel McLaren, O.B.E., B.Sc., M.I.C.E., the Chief Engineer to the Division of Civil Engineering, Department, gave a paper on "Engineering in relation to Road Safety" at the first meeting of the Council in Cape Town, last May, does it seem as though the new body were yet seized of the importance of good town planning as a means of accident prevention.

Twenty-Sixth Annual Report of the Electricity Supply Commission. 116 p.

This is an extremely well-produced and well-arranged publication. Among other subjects described are the new, projected power stations. These comprise Vierfontein, Hex River, Umgeni, Salt River No. 2 and certain others. The Vierfontein installation, designed primarily to serve the new O.F.S. goldfield, will have a capacity of 200,000 k.w. It will be sited on a coalfield, about eight miles south of the Vaal River, from which cooling water will be pumped. The initial plant, comprising five turbo-generators and nine boilers is estimated to cost £7 million. By the second half of 1953 the first unit in the station will be in commission while, three years later, it will have been increased to 12 boilers and 7 turbo-generators.

Hex River is the name now given to the projected Worcester Power Station, to obviate confusion with the municipal electricity plant at Worcester. The function of the new station is to supply the northern area of the present Cape system and to provide electric traction on the railway line as

far as Touws River. Umgeni is the new name given to the projected plant at Pinetown, outside Durban.

Apart from these and the new Salt River station, the Commission proposes a new plant at East London, adjacent to the existing station; an additional plant in the Southern Transvaal; a base-load power station at Port Elizabeth, in conjunction with the municipal station; and the acquisition of the Kimberley plant, owned by the De Beers Consolidated Mines, Ltd.

In the Report it is stated that: "Shortages of materials and, in particular, slow deliveries of insulators from overseas, have retarded progress in construction of the many new transmission lines required to meet the growing demand for electricity in all areas." Nevertheless, during 1948 transmission lines and cables increased by nearly 5,200 miles. Units sold and generated again touched a new high record. The gain in units sold, over 1947, was more than 5½ million, an increase of over 9 per cent.

Public Works Department, Northern Rhodesia. Annual Report for the year 1947. Published by the Government Printer, Lusaka. 12 pp. 1s.

During the year reviewed the total expenditure of the department slightly exceeded £1,000,000. This compares with little more than half that sum in the previous year and little over £80,000 ten years before. Though four divisional organisations exist, important areas such as Barotse Province and a large proportion of the Western Province are, at present, inadequately served by professional engineering services.

Among the largest projects started during the year was the new Livingstone aerodrome. When completed it will be one of the largest and most up-to-date airports in Central and Southern Africa. It will be capable of handling aircraft up to 75 short tons all-up weight. The runway is being bitumen surfaced and will be 7,500 ft. long by 200 ft. wide. Terminal buildings for airport control and the handling of passengers are being provided, as well as hangar accommodation. The final cost, when completed this year, will be in the neighbourhood of half a million pounds.

A ten-year plan for road development has been adopted. By this scheme some 3,000 miles of roads — classes I to IV — will be added to the 10,120 miles of gazetted roads now existing in the territory. Among the more important buildings, completed in 1947 (apart from housing) was the Katapola Eurafrican School at Fort Jamieson, at a cost of £15,000. Commenced in 1947, but not completed, were the Silicosis Bureau at Kitwe (£46,000) and the International Red Locust Control Housing at Abercorn (£40,000).

(Continued from column 2)

HOSPITAL EQUIPMENT, ETC.:

Salisbury Municipality, Rhodesia: Boilers and kitchen and laundry equipment, new Native hospitals, Bulawayo and Salisbury. Tender No. 2736. Public Works Department, Salisbury. Extended to 20/10/49.

TELEPHONE AND TELEGRAPH EQUIPMENT, ETC.:

S.A. Railways: Telegraph line material. Tender No. C.701. Due, 24/11/49. Telephone Cable. Tender No. C. 554. Due, 20/10/49. S.A.R. Tender Board, 715, P.F.A.C. Buildings, 15 de Villiers Street, Johannesburg.

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.:

Pretoria: Erection of a new arts building for the University of Pretoria. Architects: Burg, Lodge and Burg, and Meiring and Naude, 40, Koedoe Buildings, Pretoria. Names, together with a deposit of £10-10-0 to the above stated architects.

Port Elizabeth, C.P.: New gaol and quarters. Contract No. 3, and additional staff quarters. Public Works Department, Pretoria. P.W.D. 264. Due, 20/10/49.

ELECTRICAL EQUIPMENT, ETC.:

Durban Municipality: 33 k.v. pilot cable and joints. Tender No. E. 2219. Electricity Department, Durban. Due, 2/12/49.

Port Elizabeth Municipality: Low Tension Cable. Specification 337. City Electrical Engineer, Port Elizabeth. (Duplicate copies of tender documents on deposit of 10/6 — extra copies 10/6 each). Due, 3/11/49.

Pretoria Municipality: Power Station "B" — first stage: Supply, delivery and erection of 33 k.v. and lower voltage cables and accessories. Form of tender No. N. 806. Specifications from City Electrical Engineer, Pretoria, **or** the Consulting Engineers, in England, Merz and McLellan, Carliol House, Newcastle-on-Tyne. (Deposit of £2-2-0 per copy). Due, 17/10/49.

Note: The original tender and documents to: The Town Clerk, P.O. Box 440, Pretoria, and two duplicate tenders and documents to Merz and McLellan, Carliol House, Newcastle-on-Tyne, Northumberland, England.

Pretoria West: Four 11.5 k.v. neutral earthing equipments. Specification 342. Controller of Stores and Buyer, Pretoria West. Due, 24/10/49.

Zeerust (Transvaal) Municipality: Electricity change-over scheme of 1949: Supply and delivery of all material and erection to complete the above-stated scheme which incorporates the following: (1) Main H.T. and L.T. switch board, complete with connections and laying of all cable, etc.; (2) Supply and delivery of 3 only 25 k.v.a. 3-phase power transformers; 2 only 50 k.v.a. 3-phase power transformers; 1 only 100 k.v.a. 3-phase power transformer; (3) Complete change-over of extension electrical net work and underground extensions; (4) Provision of lighting and/or power service connectoins. Contract 1. Tender documents from Dr. J. K. Marais, Nataid Building, 12, Plein Street, Johannesburg, **or** The Town Engineer, Zeerust. (Deposit of £3-3-0 which should be made out to Dr. J. K. Marais). Due, 14/10/49.

(Continued at foot of column 1)

TENDERS ACCEPTED

AIR CONDITIONING AND CENTRAL HEATING :

Supply, delivery and erection of ducting for air-conditioning plant at the Central Telephone Exchange, Durban. Tender No. P. 307. Messrs. A. E. Barker, Ltd. £464.

BUILDINGS AND ALTERATIONS :

Oudtshoorn Boys' High School : Erection of Hostel and Outbuildings, etc. E. R. Schonken, £45,846.

South End Grey Primary School : New Building. J. F. Macpherson, Port Elizabeth. £40,368 17s. 10d.

Jansenville High School : Additions. Andrew Hannah and Son. £4,500.

Kensington Holland Park Primary School : New Building. D. H. Donaldson and Co., Port Elizabeth. £22,185.

Vaalhartz High School : Agricultural Buildings. Bouwer and Loubser. £5,750.

Oakdale Estate, Bellville : New Preparatory School. T. J. Donnelly, Cape. £9,481.

Compound for married Native labourers at the forest reserve, for the Department of Public Works. Tender No. 24/1/1546. D.P.W./P.W.D. 213. J. R. MacLaren, Cape Town. £8,054.

Magistrate's Residency, Vryburg, for the Department of Public Works. Tender No. 24/1/1956. D.P.W. 215. F. C. Holton, Roodepoort. £6,444.

Addition to the Strongroom of the Office of the Registrar of Deeds. Tender No. 24/1/1535. D.P.W. 205. T. H. Bissett, Kingwilliamstown. £2,430.

ELECTRICAL EQUIPMENT :

Three electrically-operated petrol pumps for Cape Town Municipality. Specification No. 1546/1949. Messrs. Banes, Consolidated Motors, Ltd. Total price delivered: £360.

Radiators for Public Works Department, Pretoria. Tender No. 24/1/1317. D.P.W./S.332. British General Electric Co., Ltd., Johannesburg. Barlows Electrical Department, Ltd., Johannesburg. Ballantine, Ltd., Pretoria.

One hundred wall bracket lighting fittings to the Department of Irrigation. Tender No. 13/1/323. S.O. 3472. Hubert Davies and Co., Ltd., Johannesburg. 10/6 each.

ENGINEERING EQUIPMENT, ETC. :

9" Concrete piping for Retreat Housing Scheme. Hume Pipe Co. (S.A.), Ltd. Total cost, £1,277 10s. 0d.

Heavy motor graders, for the Transvaal Provincial Administration. Tender No. 257/1948. W. S. Thomas and Taylor, Ltd. £3,766.

Crawler tractors for the Transvaal Provincial Administration. Tender No. 294/1948. International Harvester Co., Ltd. £2,627. Tender No. 366/1948. Reunert and Lenz, Ltd. £1,897.

Concrete mixers for the Transvaal Provincial Administration. Tender No. 300/1948. Hubert Davies and Co., Ltd. £527. Also Tender No. 301/1948. £573.

Crushing plants for the Transvaal Provincial Administration. Tender No. 366/1948. W. S. Thomas and Taylor, Ltd. (1) £23,181 8s. 0d. (2) £22,981 8s. 0d.

Mechanical shovels for the Transvaal Provincial Administration. Tender No. 367/1948. Associated Engineers, Ltd. £5,270.

Vertical crosstube boiler for the Department of Public Works, Pretoria. Tender No. 24/1/1316. D.P.W. 372. A. E. Barker, Ltd., Johannesburg. £545.

REFRIGERATION EQUIPMENT, ETC.:

Refrigerator for the South African Police. Tender No. 19/1/5. S.A.P. 449. Barlows (Eastern Province), Ltd., Port Elizabeth. £88 10s.

Refrigerator cabinet for the South African Police. The British General Electric Co., Ltd., Johannesburg. £290.

Supply, delivery and erection of refrigerating plant, etc., in the boys' hostel, Langenhoven Commercial High School, Oudtshoorn. Tender No. 24/1/17533. D.P.W. 214. Prince Vintcent and Co. (Pty.), Ltd., Oudtshoorn. £435.

TELEPHONE AND TELEGRAPH EQUIPMENT, ETC.:

Cable and cable accessories required for Public Works Department. Tender No. 24/1/489. D.P.W. S.308. Aberdare Cables of S.A., Ltd., Port Elizabeth. British Insulated Cables of S.A., Ltd., Johannesburg. Henley's (S.A.) Telegraph Works, Ltd., Johannesburg. Enfield Cables, Ltd., Vereeniging.

100 K.V.A. transformer for the New Automatic Exchange, Pretoria West. Tender No. 24/1/1512. D.P.W./S. 364. Reunert and Lenz, Ltd., Johannesburg. £323.

WATER AND IRRIGATION EQUIPMENT, ETC.:

Water supply to Government properties for Public Works Department, New Hanover. Tender No. 24/1/563. D.P.W./212. G. A. Whitehead, Pietermaritzburg. £3,435 17s.

Scientific apparatus and consumables to the Department of Irrigation. Tender No. 25/1/1320. S.O. 3299. Macdonald Adams and Co., Johannesburg. V. S. Simpson (Pty.), Ltd., Pretoria. Woolf Engineering Co., Ltd., Bloemfontein.

Water supply and drainage for Garies Good Hope Boarding Department. H. J. Bester, £13,254 7s. 8d.

9" brass bell mouths and diffusers for Steenbras Filtration Plant. Tender No. 383/1949. Messrs. Gearings (1947), Ltd. £170.

LABORATORY AND HOSPITAL EQUIPMENT, ETC.:

Two microscopes to the Onderstepoort Laboratory. Tender No. 25/1/74. S.O. 3356. Optical Instruments (Pty.), Ltd., Johannesburg. £120 each.

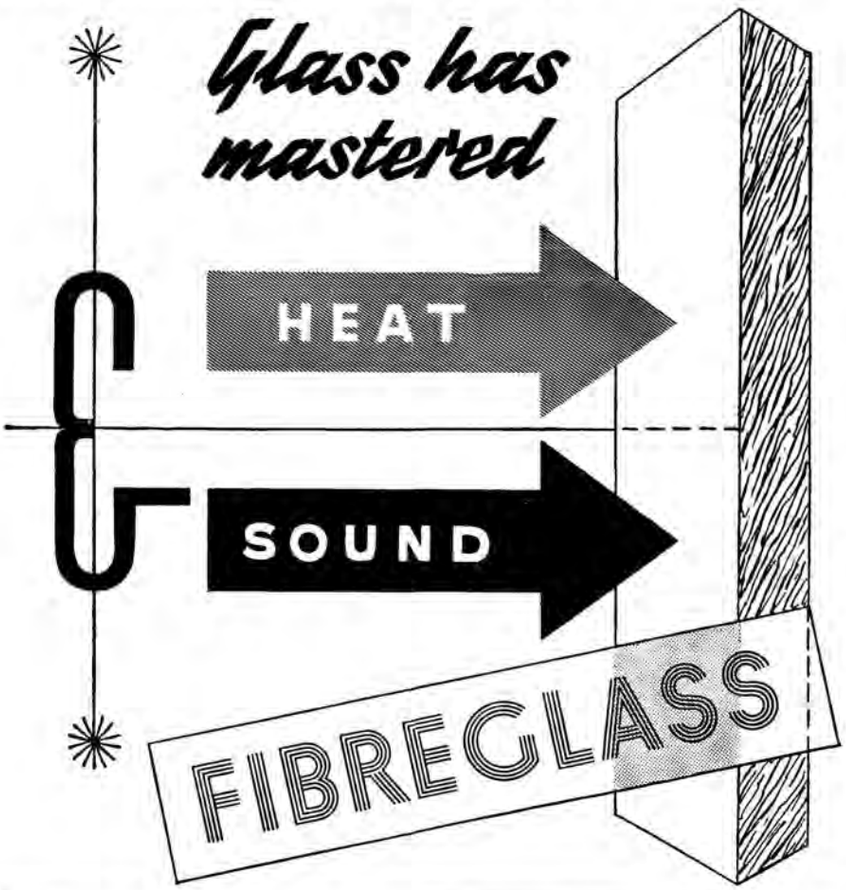
Chemicals and apparatus to the Natal Agricultural Research Institute, Pietermaritzburg. Tender No. 25/1/1785. S.O. 3332. P. J. Yelland and Co. (Pty.), Ltd., Durban, Stuart Jones and David Anderson, Ltd., Durban. A. F. H. Devers and Co., Johannesburg. Taouber and Corssen (Pty.), Ltd., Cape Town. Allen and Hanburys (Africa), Ltd., Durban. MacDonald Adams and Co., Johannesburg. B. Owen Jones, Ltd., Johannesburg.

MISCELLANEOUS:

Cement for use on Third Steenbras pipeline, Rondebosch, Cape Town. 100 drums ciment fondu. Dowson and Dobson, Ltd., £405.

Reinforcing steel for Cape Town Municipality. Tender No. 370/1949. A. S. Joffe and Co., "Cape" (Pty.), Ltd. £39 per ton.

Supply and delivery of portable asphalt mixing plant, for Durban Municipality. Tender No. B. 1676. B.M.S. Ltd.



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INFORMATION SHEET

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

Domestic Hot Water System.

26. Q: What are the advantages to be gained by insulating the hot water storage tank of a domestic hot water system?

A: Calculations show that half the heat derived from the coal burnt in the average domestic water heating installation is wasted because of the high rate of heat loss from the hot water storage tank in cases where the latter is not insulated. The following table shows the effect of different thicknesses of insulation (k = 0·5 B.T.U./sq. ft./hr./in./°F.) on reducing the heat loss from the tank (33 gal. capacity) and also indicates the percentage annual reduction in the quantity of coal used:

Thickness of insulation (inches)	Average heat loss from tank (B.T.U./hr.)	Reduction in coal burnt %
0	2770	0
1	830	39
2	560	44
3	450	46

The application of only one inch of insulating material to the tank results in a considerable saving in the quantity of coal burnt and at the current price of coal on the Witwatersrand the cost of insulating the tank should be easily recovered within a period of one year.

In addition, an insulated tank will keep the water sufficiently hot for normal requirements overnight and will also result in improved comfort conditions in the kitchen during hot weather.

Reduction of Shrinkage Cracking in Walls.

27. Q: How can cracks in walls, caused by shrinkage of building units, be reduced?

A: Many types of building units such as concrete, soil cement and some sand lime bricks exhibit length changes on drying out and walls built of such materials frequently exhibit shrinkage cracking which usually occurs first at the window or door openings. This type of cracking should not be confused with that caused by foundation settlement: the two types can usually be distinguished by the fact that shrinkage cracks are either of uniform width or wider in the centre and narrower at the top and bottom of the wall: foundation cracks are usually wider at the one end and taper off to nothing at the other end.

When shrinkage cracks take place the length changes involved are of the order of 0·1% to 0·02%. The extent of this shrinkage cracking may be reduced by the following steps:

(*a*) Apart from any requirements for curing during manufacture, the units should be kept as dry as possible before construction. This may be achieved by stacking them in such a way that air may circulate freely. They should be kept covered during rain.

(*b*) In practice the more porous and absorbent building units are soaked in water to reduce suction and to facilitate laying and bedding. Such wetting should be kept down to an absolute minimum compatible with easy laying.

(*c*) Reinforcement in the bed joints of brickwork or block construction will reduce cracking.

(*d*) Certain modifications may be made to the design. Where possible, the walls should be broken up into suitable lengths or panels with freedom from restraint at the ends.

(*e*) Cracking can also be rendered less objectionable by distributing the shrinkage in the form of a large number of very fine cracks, rather than allowing it to produce a single large crack. This can be achieved most satisfactorily by using a relatively weak mortar. A mix of one part of portland cement, two parts of slaked lime and eight to nine parts of sand, all proportioned by volume, might be found satisfactory for some types of units.

(*f*) Where a rendered finish is to be applied over masonry built from units having a high drying shrinkage the risk of cracking in the finish will be reduced if the plaster is applied when the wall has dried out, and as a general rule weak mixes should be used.

Spray-Painting.

28. Q: Will spray-painting economize in the painting of large areas such as roofs?

A: With the assistance of a labourer, a spray painter can spray-paint a roof area of 2,000 square feet in 90 minutes, whereas it has been shown that the same area cannot be painted by two experienced brush painters in much less than 290 minutes.

If the paint is applied expertly by the spray-gun considerable advantage is obtained in the durability of the paint surface, because the film is laid down much more evenly than is possible with the brush. Erosion of the paint surface occurs more gradually and evenly with time, making repainting less difficult and more effective.

Effect of Trees on Foundations.

29. Q: Can trees immediately adjacent to buildings cause damage to the foundations?

A: Generally it is unwise to place trees close to a building. The effect of the trees is to remove moisture from the soil and where the foundation is located on a soil which contains even a relatively small percentage of clay, settlement of the surface may be expected as a result of the drying out produced by this loss of moisture. In cases where the water table is high, an actual lowering of the groundwater may take place.

Trees which require a large amount of water, such as poplars, produce the worst effects but even the slower growing trees with smaller water requirements can produce severe damage if the conditions are unfavourable.

A vigorous tree with large roots may cause damage by breaking the walls physically, when large roots grow in existing cracks. This is more common for those types of tree having a surface root system. The roots of certain other trees can enter and block drainage pipes and French drains: it is advisable that these trees be kept away from pipe lines and other drainage works.

Certain practices dependent upon the nature of the soil can be used to try and reduce the possibility of damage but as a general rule it is best to keep all trees at least 30 ft. away from any building.

Gravel as Concrete Aggregate.

30. Q: Can water-worn gravel be used as concrete aggregate?

A: In answering this question water-worn gravel will be taken as meaning the coarse granular material larger than sand resulting from the erosion of rock due to its transportation in streams.

Such gravel is very extensively used as concrete aggregate in the United States, Southern England and the Continent, and makes excellent concrete provided the gravel itself is of good quality. Its advantages over crushed rock are:

(1) It is usually cheaper.
(2) Gravel which has been subject to water transportation to such an extent that the fragments are rounded will consist of the more resistant types of rock and will therefore yield more durable concrete than many crushed rock aggregates.
(3) Gravel aggregate usually contains less voids than crushed rock of the same grading and is therefore slightly superior for impermeable construction.
(4) Compared with crushed rock concrete, gravel concrete of the same proportions and grading is easier to place and will usually give the desired workability with less water.

The quality of the gravel depends upon the following factors:

(1) The smooth surfaces may reduce adhesion with the cement mortar and consequently may yield concrete with a lower crushing strength.
(2) The individual particles may be coated with a film of organic matter which is difficult to remove. If not removed this film greatly reduces the crushing strength of the resulting concrete.

It is strongly recommended that before a gravel is used as aggregate it should be thoroughly tested to disclose the presence of organic matter or other deleterious substances which may affect the strength of the resulting concrete. As a general rule, direct comparison with some known crushed stone will be a suitable test basis, and overseas experience indicates that, providing the gravel is suitable, the resulting concretes should show little difference in quality.

W.P.—67451—29/7/49