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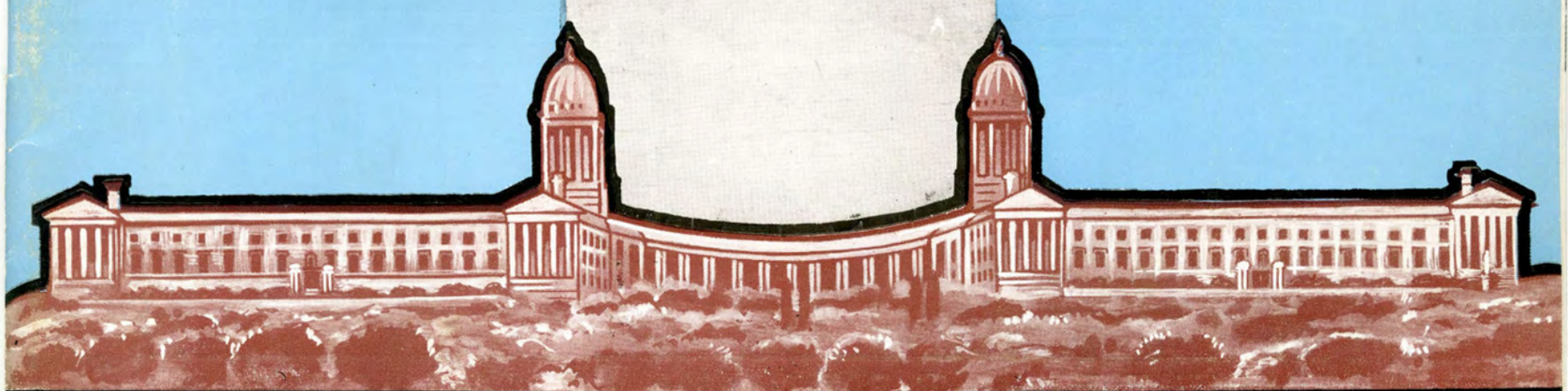
PUBLIC WORKS OF SOUTH AFRICA



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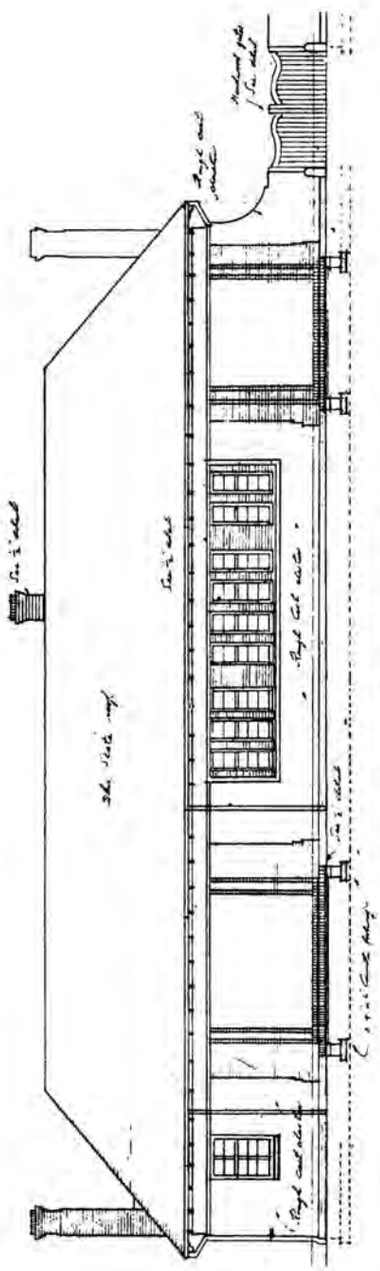
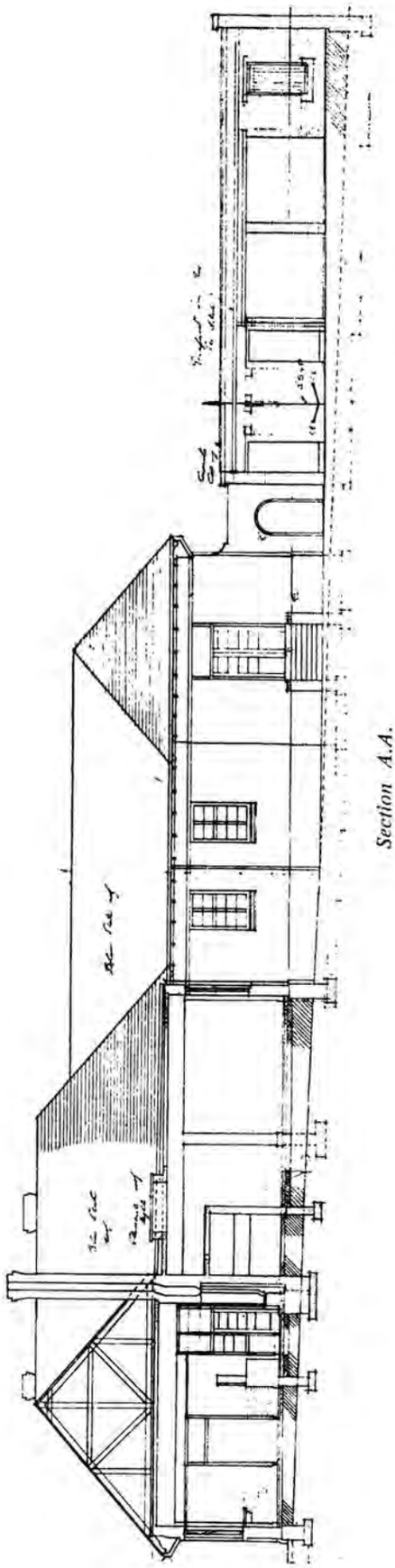
CONTENTS



Front Elevation (North).



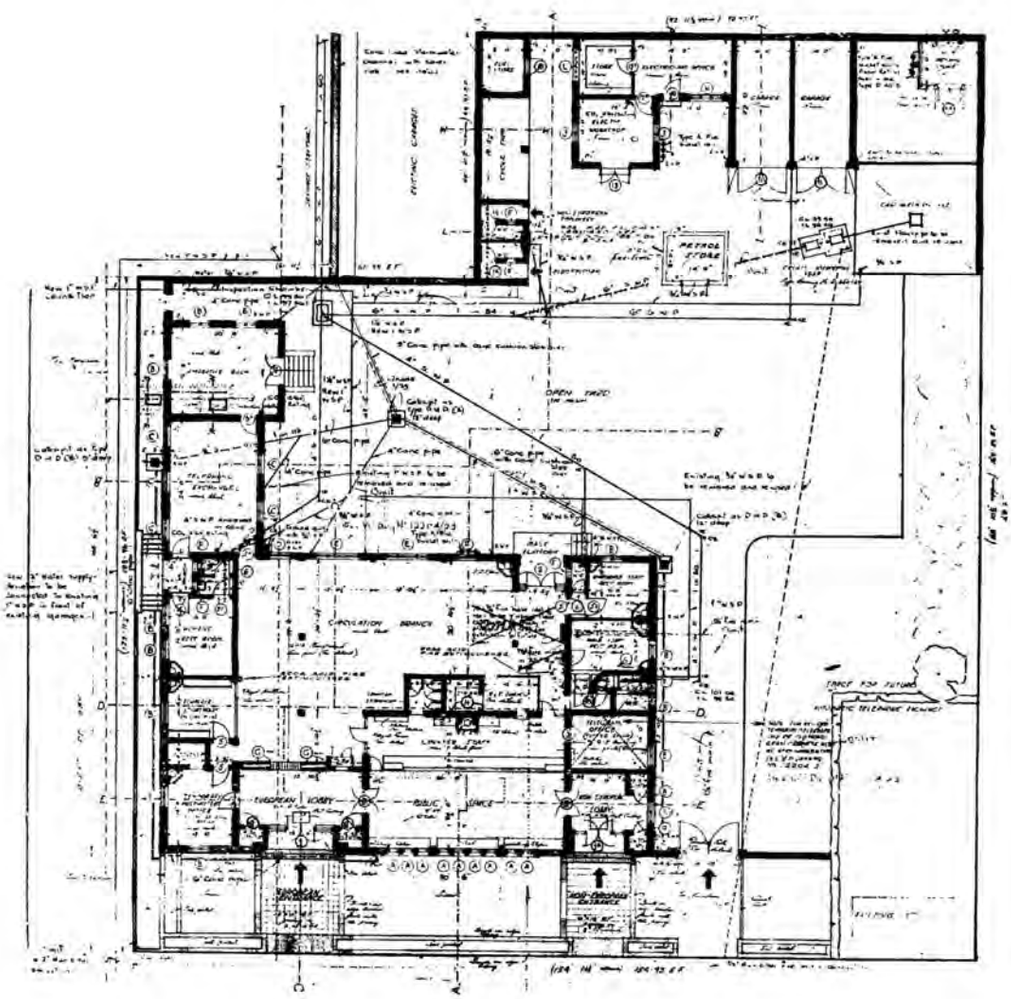
Section A.A.

DESIGN FOR NEW POST OFFICE AT HERMANUS

A NEW Post Office, designed by the Architectural Branch of the Public Works Department, is in course of erection at Hermanus, the popular sea-side resort. The site of this new building is opposite to the existing inadequate structure, and the new building faces the main street, on the lower side, which adjoins the right-of-way to the Windsor Hotel, situated on the beach front. Although the site slopes away from the street and the building line is set back approximately 18 feet from the boundary, the ground floor level has been kept above the level of the crown of the street.

Planning.

The building has been planned as a future double-storeyed structure, with the Post Office and manual telephone exchange occupying the ground floor and the postmaster, telegraph office, etc., situated on the first floor. The present contract includes the Post Office, temporary postmaster's office, women's rest room, manual telephone exchange, apparatus room, staff rooms, lavatories, etc., and a telegraph office which will eventually become the entrance, complete with staircase leading to the first floor. The European and Non-European entrances have each been kept separate and are provided with glazed swing doors. Ample silentia accommodation is provided in each lobby. Although space is reserved for 300 private letter boxes, only 100 are being provided under the present contract. A superficial area of 500 square feet is provided as public space and there are ample writing slopes and also a seat for persons who have to wait when making long distance telephone calls. The counter, which is approximately 36 feet long, has a glazed screen in place of the usual metal grille. This screen is formed with uprights and rails in muuli wood filled in with a ¾-inch thick plate glass, which is



Ground Plan.

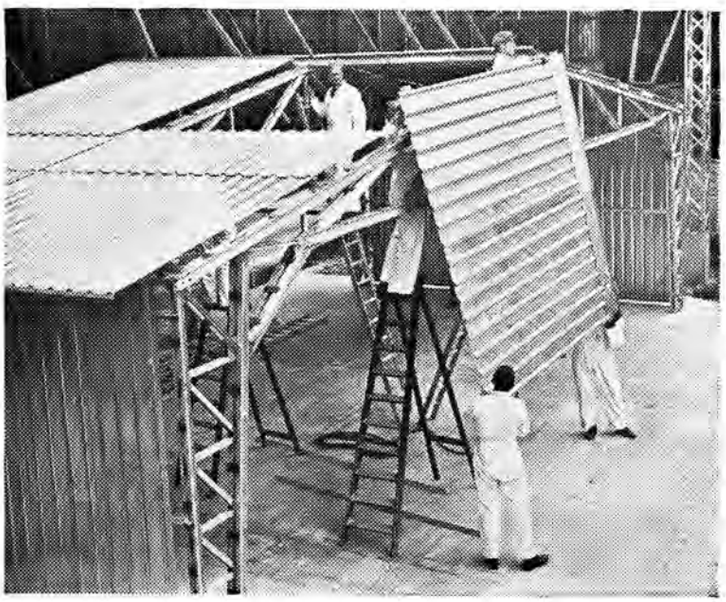
notched at counter level for postal transactions and provided with an aperture to facilitate conversation. These notches and apertures occur in each of the five divisions into which the counter is divided. The counter staff is separated from the circulation branch by glazed screens, but have direct access to the counter strong room which is provided with concrete cupboards each fitted with a steel door. An adequate amount of shelving is provided in and over these cupboards. The main strong room is entered through the registered letter cubicle and is similarly equipped with shelving. The registered letter cubicle is entered from the spacious circulation branch. Registered letters and parcels can be passed from this cubicle to the counter staff direct through a hatchway. Rest rooms complete with the usual conveniences are provided for the uniformed staff and for the male staff. Outside the circulation branch is a loading platform for use in the receiving or despatch of mail. Advantage has been taken of the sloping ground to fix this platform at a height convenient for the postal vans. The Post Office can be isolated from the activities of the manual exchange, the telephone staff having access to the exchange at any time. The cable vault to the apparatus room is easily accessible in the event of the requirement of any additions, extensions or repairs to the telephone cables. Heating of the various offices, including the areas for the counter staff and circulation branch, is by means of slow combustion stoves. These stoves are set in recesses constructed in faced brick. A portion of the site to the right-hand side of the Post Office has been set aside for the future automatic telephone exchange. The two buildings will ultimately be linked together by a wall which will incorporate ornamental muuli gates. A portion of the wall and gates is being provided in the present contract. The open yard for various postal and engineering activities is entered through these gates. In this yard are the outbuildings, comprising the electrician's office, workshop, fuel store, cycle shed, garages and a washing space for the post office vehicles. These structures are erected against the back or southern boundary wall.

Finish (Internal).

The entrance lobbies, silentia and the public space are paved with 9 inch by 9 inch red quarry tiles. The walls are finished with facing bricks, with the exception of the silentia and public space which have a brick-faced dado up to a height of the counter. The front of the counter is similarly faced. Cement plaster with oil-painted dadoes are used in the apparatus room, telephone exchange and uniformed staff room, etc. Above the dadoes, lime plaster is used with distemper finish. The offices and women's rest room are lime-plastered with similar finish. All toilets have the walls finished with glazed tiles.

Finish (External).

The external finish to the Post Office is rough-cast plaster, coated lime white, with red brick and tile dressings, and covered with a blue slate roof. The boundary wall in front of the Post Office is constructed to provide a pocket in which flowers will be planted. Entrance thresholds are in brick set on edge, while the approaches to the European and Non-European entrance are tiled. Messrs. J. N. van Niekerk are the contractors, and the contract will be carried out for the figure of approximately £21,000. It is anticipated that the building will be completed and ready for occupation during the latter half of the year 1949.



THE ALMIN EXPORT EXHIBITION IN LONDON.

Among the achievements of British industry in the export feld, the record of the United Kingdom light metal fabricating industry is impressive — direct exports of aluminium alloy semi-manufactures in 1947 were valued at £7½ million compared with less than £1 million in 1938. However, this sevenfold expansion of direct exports, although well above the national average, is by no means the full measure of the industry's contributions to the export trade. Since 1938 a five-fold expansion of the aluminium fabricating industry has placed it among the country's basic industries. Britain's exports traditionally consist in the products of her engineering enterprise and skill rather than in raw materials and it is in the form of manufactured goods and components that the main volume of light metals is exported. The estimated total value of products of the aluminium fabricating industry exported in 1947, in all forms, was £20 million — that is, about seven times the equivalent figure for 1938.

Assembling the "Alframe" building in aluminium alloy. The size of this standard building is 38 feet span by 72 feet long, weight complete, 4½ tons. It takes 80 man-hours to erect.

THE IMPORTANCE OF PLANT ECOLOGY IN HYDRO-ENGINEERING PROJECTS

By
ERIC HARDY, F.Z.S.

This article draws attention to the value of a knowledge of plant ecology in making decisions in the development of irrigation schemes.

LACK of information on plant ecology may prove costly on large-scale hydro-engineering projects. The many great irrigation and reclamation developments that have been undertaken in recent years in the desert regions of the Middle East have focussed considerable attention upon the influence of plant life on such work. These projects — ranging from the Palestine plan for diverting the waters of the Mediterranean into the Dead Sea to the huge Nile Valley Authority project — make it increasingly apparent that before the engineer cuts his watercourse the forester, the botanist, or the ecologist should inform him of the changes it will make in the plant life of the region.

In a recent lecture on the value of ecology in land development, Dr. Hugh Boyko, of the Palestine Government Department of Forests, cited his own official experience to show the influence of the underground water level on surface vegetation. If hydraulic projects change the groundwater level, the whole vegetation of the area may be changed with vital consequences. Warned of such consequences beforehand, the engineer can choose the optimum level for agricultural development, and avoid the consequent expense of having to raise or lower the water level a few feet.

An example of the wasteful results of ignoring plant ecology may be cited in Hungary, where some 85,000 acres of the great plain was drained and the water level lowered too deep for agricultural purposes, with the result that 20 years later the entire area was barren.

Certain plants are useful in indicating geological formations, and often rectify local omissions on geological maps. For instance, limestone deposits that have been buried for centuries have been detected by the discovery of "indicator plants" flourishing in the surface soil.

Prevention of overgrazing is, of course, another factor of importance in preserving the proper plant ecology. The ubiquitous goat is responsible for much of the historic soil erosion in North Africa, Palestine, Syria and India. For instance, certain Mediterranean areas that are heavily grazed have been found to be losing surface soil at the rate of 3 to 3½ mms. a year.

Engineering schemes are now planned to raise the standard of living in the whole of the Middle, and much of the Far East, where water is more of a national revenue than gold or uranium. A half century has passed since Egypt's great irrigation scheme got under way with the completion of the Esneh Dam. Until the Nile irrigation scheme was put into effect, the country was so bankrupt that its national income was not sufficient to pay the interest on the national debt. The writer spent some time in Egypt, studying the irrigation works, the flood areas, and the vegetation above and below Cairo and found that the natural vegetation has been much restricted by overgrazing and extensive demands for fodder.

The writer has seen the Nile floods spread the detritus brought down from the volcanic plateau in Abyssinia and the swamps of the White Nile, which raises the cultivable land at the rate of 3½ inches a century. In some parts of Egypt there is a deposit of more than 30 feet of Nile mud. The flood-water level is an index of the country's prosperity, for there may be a difference of 10 feet between high and low floods and a 23 feet rise at Cairo compared with 26 feet at Assuan. However, Nile floods, despite the storage dams, sometimes cause serious damage, as the writer witnessed in 1945 and 1946. Because of lack of sufficient surface vegetation, torrential rains at Maerdy, above Cairo, caused severe flooding of the low-lying lands adjacent.

The interdependence of plant life and water supply has been demonstrated in the recovery of Indian desert areas, where the temperature range is from 0 to 125 degrees F. In Baluchistan, for instance, mesquite is widely grown as a vegetation cover for protection from wind erosion as well as fodder for goats. The Sind Irrigation Department has experimented in the cultivation of cereals in salty desert areas, using Persian clover to get rid of the excessive salt. The Persian clover, or shaftal, is also widely grown in East Persia and Afghanistan. Babylonian willow and tamarisk, which are similarly tolerant of salty soils and extreme temperatures, are planted as a vegetation cover in Seistan and near Sili.

Unfortunately there are not enough plant ecologists to accompany engineers and investigate and apply, at the inception of a project, what Dr. Boyko calls the "geo-ecological law of distribution." It is my belief that this newly defined law of biological standards will have a far-reaching effect in the avoidance of costly mistakes on engineering projects by recognising beforehand the significant changes in vegetation.

MODERN HOSPITAL BUILDING

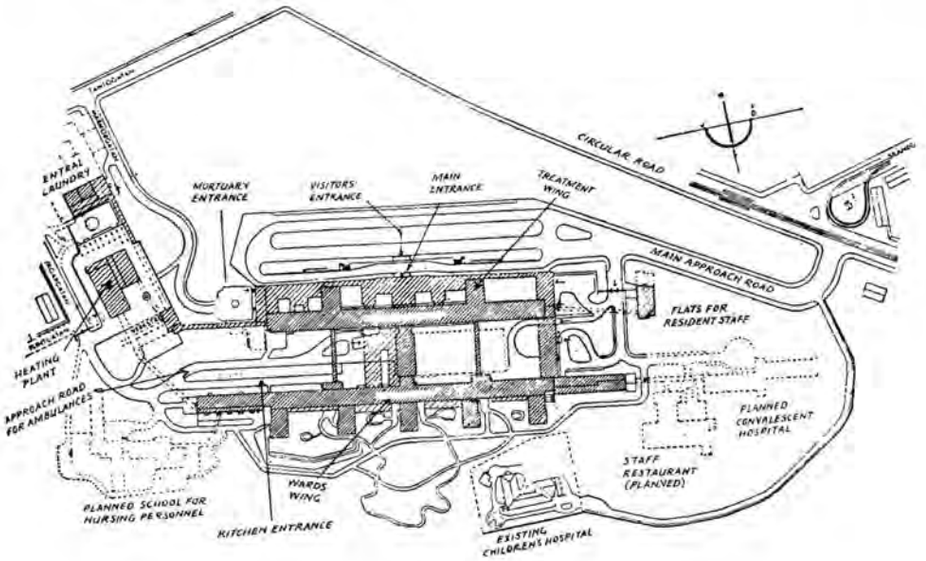
A SURVEY OF RECENT TENDENCIES IN PLANNING

Photo:
"Building Digest."

The New South Hospital — Stockholm.
(Architect: Hjalmar Cederström).

MONSIEUR ANDRÉ SCHIMMERLING, in a survey of the trend of modern hospital building, published in the November, 1947, issue of "L'Architecture d'Aujourd'hui," draws attention to the distinctly different principles adopted in the organisation of General Hospitals, a difference which exists to some extent between Europe and the United States. It is pointed out that there is a tendency in the United States to abandon the "vertical" type of hospital, and to develop instead a system of level communications between the bedroom wards and also between the diagnostic and therapeutical service. This means that operating theatres will generally be incorporated on the same floor as the wards which they serve. In a similar manner, laboratories and consulting rooms are preferred on the same floor as the bedrooms. In general, this principle in planning entails the provision of T-shaped or H-shaped building blocks in cases where the wing for the diagnostic and therapeutical cases is orientated at right angles to the bedroom wing, and frequently to the south of it. A good example of this type of planning is the Cumberland Street Hospital in New York. There is an even more recent tendency to place the operating theatres on the ground floor, which has been made possible by the more general adoption of artificial lighting for these rooms. This arrangement offers greater facility for using the operating theatres for urgent cases of first aid, and enables the usual special first aid service near the entrance to be dispensed with. Furthermore there is the added advantage of closer liaison with the complementary diagnostic and therapeutical departments. By means of this arrangement, there is the possibility that small hospitals or those of medium size will be able to combine the medical departments in one block.

These modern tendencies in Europe are strikingly portrayed in the illustration of the South Hospital in Stockholm which was completed in the year 1946 and is the most recent large General Hospital to be built in Europe. This building, which is arranged on a functional basis, is longitudinally developed and characterised by the provision of two parallel wings, one of these providing accommodation for bedroom wards and the other for diagnostic and therapeutical services. The block on the south side is a nine-storey building for the



Site Plan.

wards, and that to the north a five-storey examination block for both in-patients and out-patients. These two blocks are connected by four communicating blocks, which provide a total of sixteen communicating routes. Accommodation is provided for 1,193 beds. These transverse connections between the two wings have been provided to solve the circulation problem, which is complicated because of the extent of the building. This arrangement is designed to meet the contingencies of a service that is much less mechanised than in the United States. The tendency to centralise the various services in one single block is now prevalent in nearly all countries, and it is suggested that this system tends to convert the hospital into a highly organised but soulless institution on the lines of a large modern factory. Excluding consideration of the effect on the mentality of the patient, it is pointed out that this tendency is largely justified by the development of therapeutical technique, which necessitates the concentration of the various technical "cells."

BOOK REVIEW

THE CAPE TOWN FORESHORE PLAN

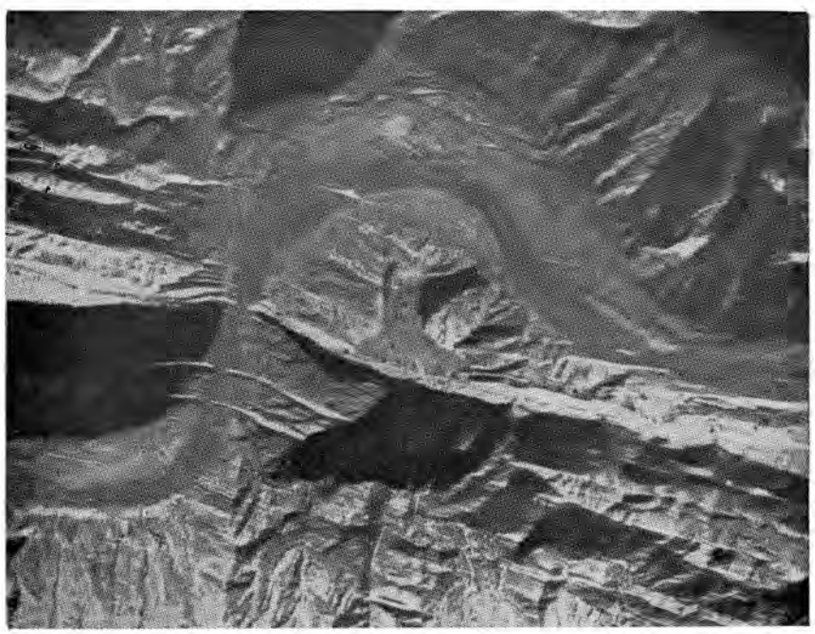
Printed by the Government Printer of the Union of South Africa, 1948, price £1.

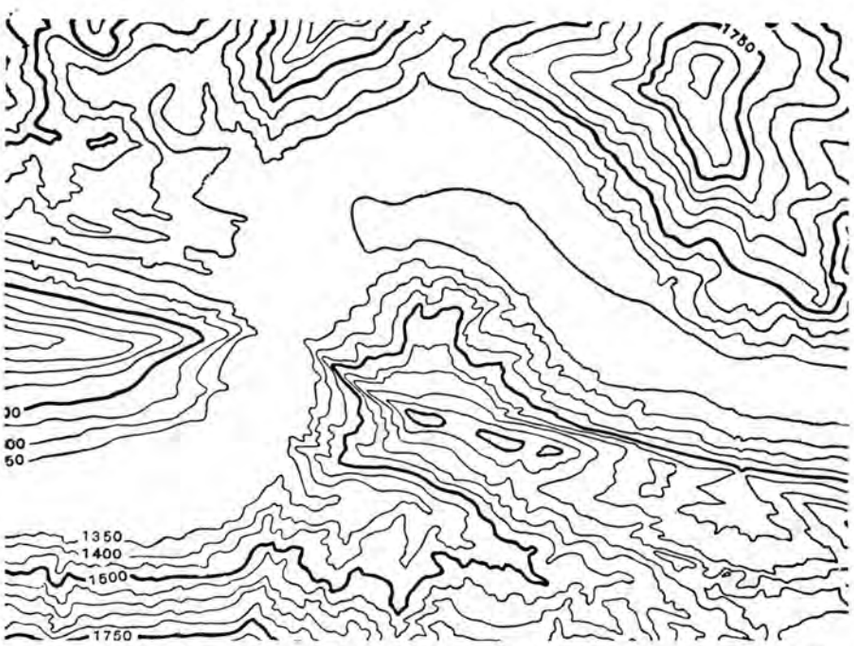
The final report of the Cape Town Foreshore Joint Technical Committee, June, 1947, has now been published in an interesting book with the above-mentioned title. In a foreword by Mr. Sidney Waterson, Minister of Transport, mention is made of the difficulties encountered in the preliminary work, and the care and forethought which have been necessary in preparing this new scheme to ensure the retention of the dignity that has characterised the nation's oldest city. The book contains an interesting survey of the historical development of Cape Town, and mentions the proposals for the improvement of the foreshore which were first submitted by Mr. C. E. McLeod in 1907, and later by Mr. T. P. Francis, City Engineer of Cape Town, in 1934. The chapter which deals with the history of negotiations up to the report of the Szlumper Commission contains an analysis of the recommendations incorporated in these early plans, which have assisted the Technical Committee in the clarification of the problems that preceded the preparation of the final scheme. The foreshore plan, as finally approved, includes as component elements, monumental approaches

(a) from the sea — described as the Gateway to South Africa ;

(b) by land — appropriately referred to as the Grand Boulevard,

also a Customs House, new railway station, railway administrative offices, railway hotel, site for Civic Centre, parks, gardens and parking areas. The book is copiously illustrated and, although free from the usual technical jargon, contains an abundance of information including detailed statistics which are presented in a lucid manner. This story of the evolution of the Cape Town Foreshore Plan should interest the majority of people, and prove a valuable addition to Everyman's bookshelf.





An example of air survey for topographical mapping, 1:10,560 survey with contours at 50 feet vertical intervals, for the development of a new oilfield at Gach Saran, Persia. This is an excellent example of the value of air surveying in country that is difficult of access, rugged, mountainous and sparsely inhabited.

THE SCIENCE OF AIR SURVEYING

By
P. G. MOTT, B.A., A.M.I.C.E.

There have in recent years been rapid developments in cartographic methods, the greatest, involving the introduction of the aerial camera, being photogrammetry. Mapping from the air is a new science, and provides a field of uses so wide as to be of almost universal interest. The author of this article is chief surveyor of Hunting Aerosurveys, Ltd., an Associate company of the Aircraft Operating Co. of Africa, Ltd.

PHOTOGRAMMETRY, or the science of measurement from photographs, began in the middle 19th century when a Frenchman, Aimé Laussedat, constructed a measuring camera fitted with level and compass. This had horizontal and vertical reference marks for locating a point where the optical axis of the lens met the sensitised plate. The principles embodied in the first "photo-theodolite" are similar to those applied in modern survey cameras.

The most important advance in the application of photography to mapping was the invention of a projection apparatus employing the use of a double image — by an Austrian, Theodore Scheimpflug, in 1898. Two cameras were fastened to a table and used to photograph a model of a landscape showing ground relief. After development the negatives were replaced in the cameras, each being illuminated from behind, so that the rays of light took exactly the same paths out of the cameras as they had taken on entering to make the photographs. With the aid of an intercepting screen two projected pictures could be viewed, which overlay and cut through one another, those points alone being in coincidence which presented the section of the object formed by the plane of the screen. It was thus easy to draw the sections corresponding with the several positions of the screen, so that plans showing contour lines could be prepared.

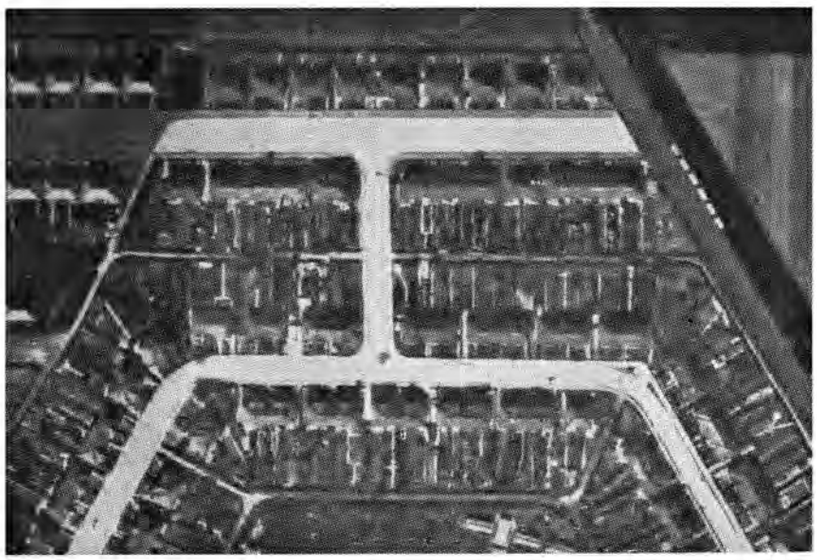
The Williamson O.S.C. air camera, which takes a photograph 9 inches square and carries a magazine of 500 exposures. It is completely enclosed, and can be heated to overcome the difficulties of photographing from great heights.

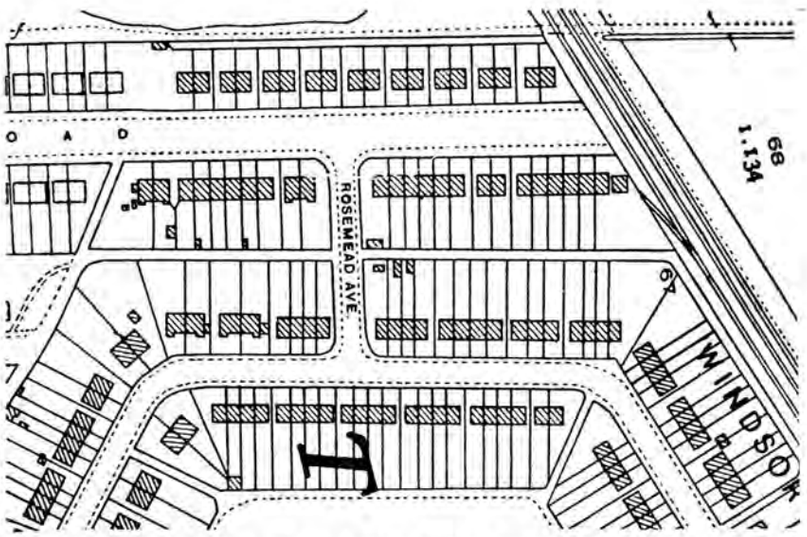
Binocular System.

Scheimpflug's experiment formed the basis of stereophotogrammetry as we know it to-day. The idea was carried a stage further by the introduction of a binocular system containing a fused reference mark which appeared to float in the relief model of the landscape as viewed through the binoculars, and could be brought into coincidence with the point of the object to be measured.

The first air photographs were taken nearly 100 years ago from captive balloons. Laussedat again appears to deserve the credit for first applying air photography to mapping when, in 1858, he undertook the plotting of surveys from balloon photographs. It was not, however, until the advent of the aeroplane and the many advances made as the result of the 1914-18 war that air survey began to play an important part in cartography.

Between the two world wars, alongside the startling changes in aircraft design and performance, developments no less remarkable took place in the field of aerial survey. On the Continent, particularly in Germany and Switzerland, research was concentrated very largely on the production of elaborate three-dimensional plotting apparatus designed to reconstruct the geometrical conditions at the moment of exposure, and thus to compensate for random errors of tilt in the photography. In England and in India more attention was paid to the simpler graphical methods of plotting. Since these involved no expensive equipment and provided results sufficiently accurate for small-scale mapping, they were considered to be the most economic. There was a tendency in Britain either to ignore or to condemn the mechanical solution of the problem and it was natural in a country as highly civilised and well mapped as England that little consideration was given to the wider potentialities of air survey for large-scale mapping in connection with town planning, road construction and dam sites.





Portion of a 25in. Ordnance Survey cadestral plan revised from the air photograph shown above. The original plan showed only the railway and open fields prior to development

Military Intelligence.

The second world war changed this attitude. For the first time in the history of warfare, air photographs became of primary importance as a source of military intelligence on which depended the planning of almost every military operation in every theatre of war. By the same means up-to-date maps of towns and fortified areas in occupied territory were reproduced with an accuracy and speed that were far in advance of former ground survey methods.

The pre-war conception that maps made from air photographs could never be accurate was quickly disproved. The majority of those in the three Services who at one time or another had cause to make use of a map compiled from air photographs came to value the accuracy of the information provided. The product of one photographic flight may be studied by agriculturists interested in crops, soil types, and erosion control; by foresters for afforestation; by geologists for structures indicating possible mineral wealth; by assessors for adjustment of taxes; and by engineers for development of cities, water power, navigability of streams, and routes for highways, railways or transmission lines.

The following are typical examples of air-surveys which have been undertaken over the past twelve months in various parts of the world:

- 125,000 square miles of the timber area of the Canadian Province of Ontario to provide a forest inventory with maps at 1/15,000 scale.
- 6,000 square miles in Arabia were photographed in six weeks at 1/30,000 for geological interpretation and mapping at 1/50,0000 scale.
- 4,000 square miles in Persia for the production of Photomosaics, maps and plans at varying scales.
- 5,000 square miles in Colombia for exploration of oil resources.

Map Revisions.

In England one air survey company alone has photographed during the year a total area of 94,000 acres and is engaged on the revision of some forty 26-inch Ordnance Survey plans for local authorities as well as the production of new large-scale plans at 1/1,250 with contours at five-foot intervals, required for town planning and in constructional engineering projects.

The technique of air survey has gained immeasurably from the experience of the past six years. Thermostatically controlled cameras, automatic pilots, camera stabilising controls and fixation of the aircraft in space by radar and radio aids are among the many inventions that have resulted from war-time research and will enable aerial mapping to reach even higher standards of accuracy at less cost in the future.

There are two types of air photographs. "Verticals" are taken with the camera pointed vertically downwards; they resemble a map or plan of the ground and are the type generally used for survey. "Obliques" are those taken with the camera pointed well away from the vertical and normally show the natural horizon. These latter resemble more the view seen by a ground observer, but their use is generally limited to the mapping of undeveloped areas at scales of 1/100,000 and smaller.

Vertical Photography.

Vertical photography takes place in the form of a series of parallel strips overlapping laterally by thirty per cent. The shutter speed of the camera is regulated so that successive exposures overlap in the direction of flight by sixty per cent. By this means every object on the ground will appear on the exposures taken from two or three different air "stations." The risk of "gaps" through inaccurate flying is in this way reduced to a minimum.

The scale of the photographs is related to the focal length of the camera and the height of the aircraft above ground. In turn, the height of the aircraft is limited to its service ceiling, above which the aeroplane cannot fly with sufficient stability for survey photography. Where it is intended to use the most precise machine methods of plotting in the construction of a map, the desired contour interval is all-important in deciding the flying height.

Degree of Accuracy.

Excluding economic considerations, the essential attribute of any map is that it should be accurate to a degree in conformity with the plottable accuracy at the required scale. This is generally accepted to be 1/50th of an inch at the scale of the map. Thus an error of one hundred yards on the ground would scarcely be plottable on a quarter-inch to the mile map (1/253,440), but at the scale of a twenty-five inches to the mile (1/2,500) Ordnance Survey plan a measurable error greater than four feet on the ground would not be tolerated. It must be understood that an "air survey" is, in fact, a survey of the ground and must, therefore, be related to the ground by identifiable points of detail on the photographs, the co-ordinates and heights of which are known to a slightly greater order of accuracy than is expected from the resultant map. Such points are known as "ground control" and are established by a surveyor on the ground with the aid of theodolite and level. It is of the utmost importance particularly in machine methods of mapping that these ground control points are certain of identification on the photographs and correctly disposed to enable the reconstruction of the three-dimensional model formed by successive pairs of overlapping photographs.

By radar and radio methods it is now possible to fix the position of the aircraft in space at the moment of each exposure with sufficient accuracy for small-scale mapping. The day is not far off when the position of each exposure will be known to within the limits of plottable accuracy at larger scales and, in addition, the height of the point vertically below the centre of each photograph will be automatically determined by radar altimetry. Ground control will thus be reduced to a minimum necessary to supplement the data already supplied in the air.

In all spheres of planning—social, constructional, political and economic—maps and photographs form the basic material for study and are associated with the diverse problems of modern civilisation. Air survey can provide at one and the same time the detailed requirements of the specialist, and the wider advantages of a precisely contoured map. In speed, accuracy and cost it has had a revolutionary effect on surveying and cartography.

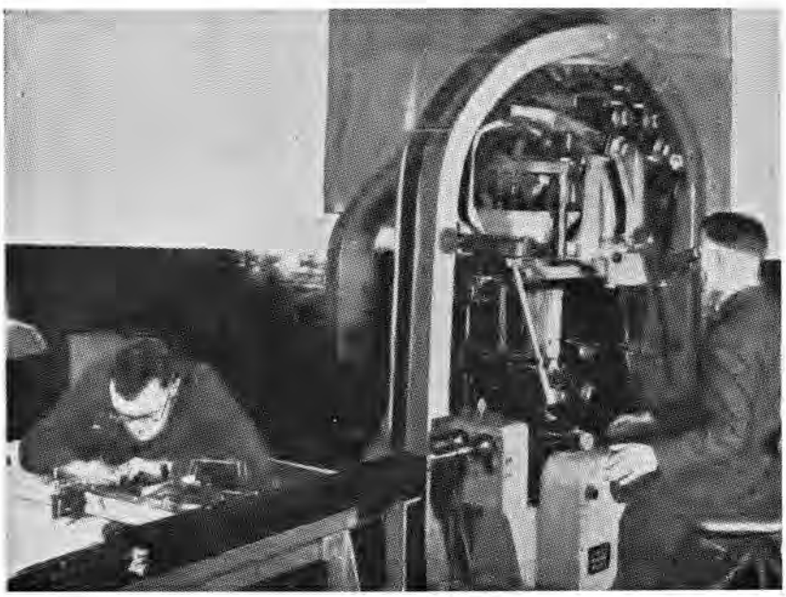


Photo by: The Aircraft Operating Coy. of Africa, Ltd.

Translating air photos into maps by means of a Wilde "Autograph A.5" in which the photographs are set up in the actual position they occupy at the moment of photography. By observing the photographs stereoscopically through a binocular system, a three-dimensional view is obtained of the landscape from which it is possible to map on scales up to 1 : 1,000 with contours at 5 feet vertical intervals.

WHAT IS SEWAGE SLUDGE AND HOW IS IT DEALT WITH?

By
A. L. ABBOTT.
City Chemist, Cape Town.

This Paper was presented at a Conference of the South African Branch of the Institute of Sewage Purification, which was held recently at Pretoria.

THE term "sewage sludge" will be used many times — ossibly *ad nauseum* — during this conference and a ew words describing this material may lead to a clearer understanding of subsequent papers.

Any sewage treatment scheme worthy of the name embodies the following three basic processes :—

1. Separation of settleable solids from the liquid portion of the sewage.
2. Purification of the liquid portion.
3. Disposal of the solid matter.

Although to-day's discussion centres round the third of these basic processes we are indirectly interested in the other two as it is from the first two processes that the sewage sludge is derived.

The treatment unit mainly responsible for the separation of settleable solids from the raw sewage is the primary settling tank and it is the settled solids from this unit which form the greater part of the sewage sludge. This portion of the sewage sludge is referred to as primary sludge and the solid matter therein is usually associated with 94-95 per cent. of water. Of course the character of the sewage and the type and efficiency of the sedimentation tank have a considerable bearing on the nature of the primary sludge and the moisture content may vary in extreme cases from 92-98 per cent.

The pre-sedimentation treatment to which the sewage is subjected, will have some bearing on the character of the primary sludge. A grease recovery unit will reduce the fat content of the sludge, sand traps or detritus channels will remove most of the settleable inorganic material from the primary sludge, while maceration of screenings and flocculation will increase the quantity of material settling out in the sedimentation unit.

During the purification of the liquid portion of the sewage, be it by means of activated sludge or through the medium of biological filters, a certain amount of the non-settleable solids originally present in the raw sewage will be rendered settleable. These settleable solids, together with certain spent biological growths associated with the purification processes, are settled in suitable sedimentation units and constitute that portion of sewage sludge known as secondary sludge. The quantity of secondary sludge produced varies with different methods of purification. Slow rate biological filters produce relatively small quantities of settleable solids except for short periods, usually in winter when considerable discharge of accumulated growths occurs. High rate filters and activated sludge plants produce a relatively greater amount of secondary sludge without seasonal variations.

A characteristic of secondary sludge is its light, flocculent nature and high moisture content — usually 98 per cent. or more. This factor often renders the subsequent disposal of secondary sludge a problem out of proportion to its solid content. For this reason secondary sludge is invariably mixed with primary sludge before final disposal. In many sewage treatment plants the secondary sludge is returned to the raw sewage ahead of the sedimentation units, in which case the primary and secondary solids settle out together and form a sludge having a moisture content of 95-96 per cent.

The chemical composition of the sludge is dependent on the standard of living and diet of the contributing population, on the extent to which industrial wastes are admitted to the sewerage system and on the type of sewage treatment plant. These factors are so variable that it is impossible to lay down even a general formula indicative of sludge composition. It is perhaps a safe guess to say that sewage sludge will contain carbohydrates, proteins and fats in that order of magnitude.

The moisture content of sewage sludge is a very important factor in its subsequent disposal. It must be appreciated that a 5 per cent. reduction in moisture content from 95 to 90 per cent. means increasing the amount of dry solids per 100 lbs. of wet sludge from 5 lbs. to 10 lbs. Such a reduction in moisture content has the effect, therefore, of halving the required disposal capacity, whether that capacity be in the form of transportation, storage or drying. It is obvious then that any modification in the design or operation of sedimentation tanks resulting in a sludge with a lower moisture content will assist considerably in the disposal of the sludge.

While the volume of sludge produced per unit of population is a function of local conditions and cannot be arrived at by the application of a formula, a typical example may give some idea of the quantity of sludge involved. At Cape Town's main sewage works, which deals with mixed domestic and industrial sewage, the daily quantity of sludge to be disposed is approximately 150 lbs. of dry solid per 1,000 head of population or 68 gms. per capita. This includes the secondary sludge from high rate biological filters.

Methods of Disposal.

Untreated sewage sludge is unstable and, if left to its own devices, will undergo putrefaction and decomposition during the course of which highly offensive conditions will be created.

The primary object of any method of sludge disposal therefore should be to prevent the development of these offensive conditions.

Apart from its offensive potentialities sewage sludge is liable to contain such pathogenic bacteria, helminths and protozoa as may be found in raw sewage and disposal methods should include reasonable precautions against the spread of disease.

A third consideration is the utilisation of the potential fertilising or fuel value of the sewage sludge. This question has to be considered carefully in the light of local conditions such as land and market values, population density, transportation charges and a host of other factors which may make it uneconomical to exploit the potential value of the sludge.

The methods of sewage sludge disposal which are common throughout the world may be divided into three main classes :

1. Direct disposal of the wet sludge. Under this category are included dumping at sea and trenching and direct application of sludge onto land.
2. Dewatering without stabilising treatment.
3. Stabilising treatment followed by dewatering.

Dumping at Sea.

Disposal of sludge by dumping at sea is practised in several cities in Great Britain and America although it has no application in this country. Sludge is pumped directly from the sedimentation tanks to suitable vessels either of the barge type or self-propelled and taken to special dumping areas. These dumping areas are usually located at least 10 miles from the coast and well away from fishing grounds and normal sea routes. Sludge vessels are fitted with bottom outlet valves and the sludge is discharged while the vessel traverses the disposal area. The moisture content of the sludge has an important bearing on the cost of marine dumping and strenuous efforts have been made to get rid of excess water before pumping to the sludge vessel. Successful reductions in moisture content have been attained by various "thickening devices" and in one case the sludge is actually filter-pressed before being conveyed to the sludge vessel.

London, Glasgow, Manchester and Southampton are a few cities in Great Britain that use this method with satisfactory results.

Although not connected directly with the disposal of sewage sludge it is interesting to note that the National Lead Company of America has recently put into commission a barge for the disposal at sea of industrial waste. This barge is claimed to be the largest of its kind in the world and can handle 4,000 tons of waste per day.

Dumping at sea makes no use of the potential value of sludge but it provides a satisfactory and hygienic solution to a problem which is difficult and costly in a densely populated coastal area.

Direct Disposal of Sludge on Land.

Sludge may be discharged directly onto land and ploughed in or it may run into trenches which are filled in with soil when full. This method is not as cheap as might be expected ; it requires a large amount of land and is by no means free from odour and fly troubles.

Dewatering.

Dewatering processes are applied to all methods of sludge disposal except the two already mentioned. In some cases dewatering is carried out on the untreated sludge and in others on the treated material. Dewatering alone will not produce a permanently stable product although it may postpone decomposition for sufficient time to allow the sludge to be transported and utilised before offensive conditions develop.

At present the most common method of dewatering is air drying. Drying beds are constructed of gravel, crushed stone or similar material, overlaid with a few inches of sand and underdrained with agricultural tiles. The size of beds varies with local requirements but beds 100 feet long by 20 feet wide by 2 feet deep are not uncommon. It is not usually advisable to apply the wet sludge to a greater depth than 12 inches. The rate of drying depends on atmospheric conditions, the drain ability of the sludge and the construction of the bed. Under summer conditions well-digested sludge will dry in 4 to 6 weeks. The area of drying bed required may vary from 1 to 3 square feet per capita, the lower limit representing the capacity required for digested sludge under favourable conditions and the upper limit for untreated sludge coupled with unfavourable climatic conditions. The adverse effect of rain and cold may be minimised by using glass-covered drying beds, but of course at considerable cost, particularly if the beds are within catapult range of the sewage works boundary. Air drying is a cheap method of dewatering but is slow, dependent on the weather and, in the case of untreated sludge, gives rise to odour and fly nuisance. Air dried, digested sludge cannot, on theoretical grounds, be guaranteed free from pathogenic organisms but on the other hand, no specific infection can be traced to this product in spite of its almost universal use as a fertilising material.

The development of towns and the consequent shortage and high price of land suitable for sewage disposal works has placed greater emphasis on artificial methods of dewatering and among the latest plants there is a definite trend in this direction.

Artificial dewatering is accomplished in two stages. The first stage, which results in a sludge cake of approximately 80 per cent. moisture content, is effected by sludge filters. Neither untreated sludge nor digested sludge can be filtered directly and it is necessary to condition or coagulate the material by the addition of chemicals. Ferric chloride is the most satisfactory coagulant although alum and ferrous sulphate can be used. The quantity of coagulent is proportional to the alkalinity and the volatile content of the sludge and Gentner has devised a formula which enables the coagulant required to be calculated from a knowledge of these two factors. The cost of coagulent is often the determining factor in assessing whether or not sludge filtration will be economical and a process has been devised known as elutriation, which reduces considerably the amount of coagulant required. Elutriation consists of washing the sludge by dilution, agitation, sedimentation and decantation. The elutriant may be water or, more economically, purified sewage effluent. Experiments carried out on digested sludge at Cape Town have shown that three stage elutriation reduces the ferric chloride requirement from 8 per cent. to 4 per cent. of the dry solids in the sludge. As ferric chloride costs approximately £40 per ton the saving is considerable. Reference has been made in literature to a method of conditioning sludge prior to filtration by electrolysis but the information available is very scanty.

The earlier sludge filters were of the leaf filter press type, but these are being superseded to a considerable extent by rotating drum vacuum filters with automatic devices for draining and removing the filter cake. A vacuum filter can handle

well digested sludge at a rate of 5 lbs. of dry sludge solids per sq. ft. of filter area per hour.

Centrifugal drying of sludge is used to a limited extent for the initial stage of dewatering but it has not been able to compete successfully with the vacuum filter.

Heat driers are responsible for the final stage in the artificial dewatering of sludge. The three main types are the rotary kiln, the flash drier and the multiple hearth drier. In the rotary kiln and flash driers, filter cake is mixed with previously dried sludge to produce a mixture containing about 50 per cent. moisture, which mixture is subjected to the action of drying gases at a temperature in the neighbourhood of 1,000° F. The dried sludge from these two types of drier has a moisture content of 10 per cent.

The multiple hearth drier was originally designed as a sludge incinerator but it is often adopted to produce dried sludge. The furnace is circular with a central rotating column carrying scraper arms and has four or five hearths situated vertically above one another. The hearths are connected by ports located alternatively at the centre and at the periphery. Sludge filter cake is introduced onto the top hearth and carried by the scraper arms to the centre port where it drops to the second hearth. The scrapers on the second hearth push the sludge towards the peripheral port through which it falls to the third hearth and so on. Drying takes place on the upper two hearths while on the lower hearths the sludge burns providing the necessary heat. Supplementary fuel is necessary for this type of drier or incenerator, the amounts required varying from about 2 per cent. in the case of raw sludge to nearly 20 per cent. for digested sludge.

Incineration.

Usually dried sludge has a ready market on account of its fertilising value of which details will be heard in a subsequent paper. There are instances, however, where location and transport costs render the marketing of dried sludge uneconomical and in such instances local authorities may resort to incineration. The incinerated ash is about one-half to one-third of the dry sludge solids and its final disposal is merely a question of mechanical dumping.

Both the multiple hearth drier and the flash drier can be utilised as incinerators as well as driers and in some plants sludge is dried or incinerated as occasion demands.

Lagooning.

Lagooning is the practice of running sludge into earth basins, either natural depressions or tracts of land surrounded by dykes of earth, and allowing drying, draining and a certain amount of digestion to take place. More elaborate lagoons may be under-drained and provided with outlets for supernatant liquor.

Lagoons receiving untreated sludge will give off offensive odours and are likely to breed flies. The sludge will take a long time to dry and in consequence large tracts of land will be required. Where plenty of cheap land is available lagooning is probably the least costly means of sludge disposal, but that would appear to be its only recommendation.

The lagooning of digested sludge is merely an inefficient form of air drying and should not give rise to aerial nuisance or fly breeding.

Digestion.

The sludge digestion units of to-day are a very long call from the septic tanks of Austin, Mouras, Scott-Moncrief and Cameron. But it is due to these men, and to those who have followed on, that, in modern sewage practice, digestion holds pride of place as the most satisfactory method of sludge treatment.

The importance of this method of sludge treatment warrants special consideration since it produces a stable material that is considerably easier to dispose of than untreated sludge.

Heat Treatment.

The latest development in sludge disposal is what is known as "Heat Treatment." The process involves heating the sludge under pressure to temperatures between 300 and 400 degrees Fahrenheit. It is claimed that this method of treatment enables the sludge to be filtered without the need for coagulating chemicals and that a considerable portion of the organic matter in the sludge is rendered soluble.

Composting.

Composting is by no means a new process. It is claimed that the extensive and intelligent use of compost was responsible for the maintenance of soil fertility in ancient China and Japan. The early Greek and Roman writers mention compost and emphasize its value. But for a long time composting appeared to be a lost art until the shortage of organic fertilisers focussed attention on the process and now-a-days everyone is becoming compost-minded. The work of Sir Albert Howard at Indore has done much to put composting on a scientific basis. South Africa has not lagged behind in this sphere and much valuable work has been done at Ficksburg and on the sugar plantations.

In the main, composting has been applied to the breakdown of garbage and vegetable waste from various agricultural projects. However, Ransome, in England, has claimed success with straw-sludge mixtures, using both wet and dry sludge, and has attained temperatures high enough to destroy all pathogenic organisms in the sludge.

It would appear doubtful whether the quantity of vegetable refuse available in any community would be sufficient to cope, in a compost heap, with all the wet sludge produced by the same population. On the other hand the composting of sludge filter cake, garbage and vegetable refuse, if practicable, offers a happy solution to two problems facing every local authority. At present labour and the time factor are the main disadvantages in composting but in the past we have harnessed and accelerated the activity of the anaerobic methane producing bacteria in the digestion tank. Why should we not do likewise with their aerobic cousins, the moulds and microbes of the compost heap? If this process can be turned into an economic proposition, the problems of garbage and sludge disposal will be solved and a vast supply of valuable, bacteriologically sterile, fertilising material will become available.

In the course of these remarks on sewage sludge and how it is handled, I have endeavoured to indicate, by implication as much as by word, that some methods of sludge disposal produce a material which is 100 per cent. sterile while other methods produce a dried sludge which cannot be guaranteed sterile but which nevertheless, over a long period, has shown little sign of being a source of infection. That every effort should be made to protect the public from definite sources of infection is essential, but, in considering the theoretical possibilities of bacterial contamination through the medium of sewage sludge, we should beware of acquiring the mental outlook of the man who will not cross the street for fear of being run over.

THE ARCHITECT AND PUBLIC RELATIONS

IN a rcent issue of "Building Digest," it is stated that architects, more than anybody, bemoan the lack of interest in and appreciation of architecture. It is contended that architects must share the responsibility for this lack of interest because they do not encourage good and effective criticism, and this tends to produce an apathetic public. Mention is made of a dinner given to architectural critics by an Architectural Association in Great Britain, when an eminent architect, after ridiculing architectural critics, said quite frankly that architects do not want criticism. While it cannot, of course, be assumed that this is the outlook of the profession in South Africa, it is important to draw attention to the disadvantages that inevitably accrue from this attitude. Criticism is a stimulant to appreciation and if this is discouraged the general public will seldom be moved to expressions of appreciation. This probably applies to architecture more than to most things, because people seldom take the trouble to observe the detail that typifies the skill of the architect. In pointing out that architecture is a civic art, which to a large extent conditions our daily environment, the "Building Digest" suggests that more criticism of buildings through the press would be of social value. Although a critical opinion can be provocative, especially when given by those who are not considered to be sufficiently qualified for the role of critic, none can deny that it has often proved to be a source of inspiration.

The fundamental principles of architectural design are admittedly beyond the comprehension of the majority of people, but this fact is surely not sufficient to prevent architects from informing the public of their application in practice as shown by their designs and construction. It is by these results that the true value of the architect is assessed and, while some may contend that the opinion of the inexperienced is valueless, it is important to remember that a degree of public interest is most essential to the advancement of any profession. In this knowledge it is obviously as important to give the public information of accomplishments in architectural design and construction as it is to impart knowledge of a new technique to members of the profession.

Few people enter a building and observe the features of the construction. Sometimes, as for example, during a visit to a hospital, the mind is too engrossed with more personal matters. Similary, many other types of construction, such as railway stations, schools, etc., are usually only referred to in terms of their serviceability and are seldom associated by the public with any interesting architectural detail or planning. This may be due to the element of speed in our modern way of living, but whatever the cause it clearly indicates the desirability to provide information through the press which people may read and assimilate at their leisure. By the adoption of this guiding principle, many people would no doubt develop the habit of observing interesting architectural features and be stimulated to a greater appreciation of the architect's skill in planning. An architect's contribution to civic art may metaphorically speak for itself, but if the profession is to maintain its present high position in public esteem, it appears essential to encourage greater interest in the public and by the public. It is contended that this can be done through the medium of the press in general, without in any way encroaching on territory reserved for the professional organisation, or infringing its policy in the matter of professional etiquette.

SOUTH AFRICAN COUNCIL for SCIENTIFIC and INDUSTRIAL RESEARCH

LIBRARY ACCESSIONS

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

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

ARCHITECTURE.

ADAMS, M. W. and PRENTICE Bradley.
Dimensional co-ordination . . . The American ceramic society, 1945.
pp. 218-227. illus., (photos.), diagrs.
Reprinted from the Journal of the American ceramic society, vol. 28, No. 8, August, 1945.
This pamphlet describes a method for co-ordinating standard sizes of building products and for correlating the layout and design of buildings.
Reference 27/9. Classification Pam. 72.001 : 693.068 : 389.6

American standards association project A62.
A62 guide for modular co-ordination ; a guide to assist architects and engineers in applying modular co-ordination to building plans and details: by Myron W. Adams and Prentice Bradley; sponsored by the American institute of architects and the producers council, inc. Boston, Modular service association, (c1946).
271+p. diagrs.
Reference 27/10. Classification 72.001 :693.068 :389.6.

BEMIS, Albert Farwell.
The evolving house; vol. 3: rational design. Cambridge, Massachusetts, Technology press, (1933).
xxxv, 625 p. front., port., diagrs.
Main contents: Efforts towards rational housing; What is rationalisation ?; Mass production and the house; Standardisation for house parts; The cube as module; The theory of cubical modular design; Applied cubical modular design; The cubical module in architectural design; Rational production; Patents and the cubical modular method; Social significance of the cubical modular method.
Reference 27/12. Classification 728.001 :603.068 :389.6.

ROSENFIELD, Isadore.
Hospitals: integrated design . . . New York, Reinhold publishing corporation, (c1947). (Progressive architecture library).
308 p. illus., diagrs.
". . . . the book is primarily a personal expression of principles and methods as I have come to understand and practise them in my twenty-four years of experience." Preface.
Reference 27/13. Classification 725.51.

Royal Institute of British architects.
School planning and construction: report of a lecture conference . . . 23 and 24 October, 1947. (London) Royal institute of British architects, 1948.
42 p. illus., diagrs.
Reprinted from the Journal of the Royal institute of British architects, November, December, 1947 and January, 1948.
Reference 27/14. Classification Pam. 727.1/.2(061.3).

BIOGRAPHY.

International who's who.
The international who's who, tenth edition, 1945-46.
London, George Allen and Unwin, ltd., and Europa publications, limited, 1945-46.
xxiv, 960 p. Reference 27/18. Classification 92(100).

United States. National bureau of standards.
. . . American standard building code requirements for minimum design loads in buildings and other structures; by Sectional committee on building code requirements for minimum design loads in buildings — A58 . . . Washington, Government printing office, 1945. (Miscellaneous publication M 179).
32 p., maps, tables.
Reference 27/23. Classification Pam. 69.042.001.3 :389.6.

BUILDING materials.
WILSDON, B. H.
Standard specifications for clay building materials. Statistical control and specification of quality . . . (London). The British clayworker, 1932.
9 p. illus., tables, diagrs.
Reprinted from the British clayworker, May, 1932.
Reference 27/25. Classification Pam. 691.4.001.3.

BUILDING research.
JENNINGS, J. E.
. . . Building research in South Africa . . . (Johannesburg, printed by L. S. Gray and co. (pty.), ltd., 1948.
pp. 22-37. tables, diagrs.
Reprinted from the Journal of the engineers association (South Africa) February, 1948.
Reference 27/26. Classification Pam. 69.001.89 (68.01).
LEA, F. M.
. . . Research on building and its materials . . . (lecture given to the Leeds area section of the Royal institute of chemistry on January 14, 1946, and to the South Wales section on November 22, 1946) . . . (London) Chemistry and industry, 1947.
6 p. illus.
Reprinted from Chemistry and industry, 1947, pp. 603-608.
Reference 27/27. Classification 69 :001.89.

CEMENT.
WITT, J. C.
Portland cement technology . . . Brooklyn, N.Y., Chemical publishing co., inc., 1947.
viii, 518 p. tables, diagrs. (some folding).
Bibliography p. 463-492.
Reference 27/34. Classification Pam. 666.942.

CONCRETE.
Concrete association of South Africa, Johannesburg.
No-fines concrete: supplement No. 1. Johannesburg, Concrete association of South Africa, 1945.
7 p. tables. Duplicated.
"Because of the interest shown in no-fines concrete we have made a two months' laboratory study of the properties of this material, the results of which are given here, together with some notes on construction experience gained from the erection of a native house of 630 sq. ft."
Reference 27/47. Classification Pam. 691.32.
Great Britain. Department of scientific and industrial research. Building research station.
. . . . Studies in reinforced concrete: v. moment redistribution in reinforced concrete; by W. H. Glanville . . . and F. C. Thomas . . . London, H.M. Stationery Office, 1939. (Technical paper No. 22).
vi, 52 p. plates, tables.
Reference 27/49. Classification Pam. 624.012.4 :624.041.62.

DAMS.
Greager, William P. and others.
Engineering for dams, by William P. Greager, Joel D. Justin and Julian Hinds . . . in three volumes. New York, John Wiley and sons, inc., (1946).
3 vols. illus.
Contents: Vol. I: General design, vol. II: Concrete dams, vol. III: Earth, rock-fill, steel and timber dams.
Reference 27/52. Classification 627.43.

DESIGN.
Chase, Joseph Cummings.
Creative design . . . New York, John Wiley and sons, inc., 1934.
80 p. illus.
This book is intended for the use of art teachers and students and young designers.

ELECTRIC Lamps, Fluorescent.
Amick, Charles L.
Fluorescent lighting manual . . . second edition. New York, McGraw-Hill book co., inc., 1947.
xiii, 318 p. illus., tables, diagrs.
Reference 27/60. Classification 628.9.037+621.327.43.

FIRE protection.
Great Britain. Department of scientific and industrial research. Fire offices' committee. Joint fire research organization. Visit of director of fire research to Canada and the United States, May-June, 1947. (London, Department of scientific and industrial research).
40 p. tables. Duplicated.
Reference 27/75. Classification Pam. 614.84 :001.89 (7).

GOVERNMENT representatives.
Union of South Africa. Department of external affairs.
South African representatives abroad and representatives in the Union of South Africa (including South West Africa) of British commonwealth and foreign governments . . .
Pretoria, Government printer, 1948.
13+13 p.
Separate title pages and text in English and Afrikaans.
This is a list of government representatives, giving names and addresses and designations or titles.
Reference 27/87. Classification Pam. 35.084.25(68.0.1)

HEATING.
Allen, John R., and others.
Heating and air conditioning; by John R. Allen . . . James Herbert Walker . . . and John William James . . . sixth edition . . . New York, McGraw-Hill book co., inc., 1946.
vii, 667 p. illus. (photos.), tables, diagrs.
Reference 27/89. Classification 628.8.

HOUSES.
United States. National bureau of standards.
. . . Care and repair of the house including minor improvements; by Vincent B. Phelan . . . Washington, Government Printing office, 1931. (Building and housing publication BH15).
iv, 121 p. illus., diagrs. Mimeographed.
Reference 27/97. Classification Pam. 69.059.2 :728.

HOUSING research.
Great Britain. Department of scientific and industrial research and Incorporated association of architects and surveyors.
Research in housing standards. London, Department of scientific and industrial research, (1947).
15 p. front., tables.
This is a handbook issued in relation to the Building Science Exhibition arranged by the Department of Scientific and Industrial Research and held in conjunction with the Building Science Convention of the Incorporated association of architects and surveyors, at Caxton Hall, Westminster, S.W.1, on the 13th to 18th January, 1947.
Reference 27/98. Classification Pam. 69 :728.

INSULATION (heat).
United States. National bureau of standards.
. . . Effect of ceiling insulation upon summer comfort; by Thomas D. Phillips . . . Washington, Government printing office, 1940. (Building materials and structures report BMS 52).
9 p. illus., tables, diagrs.
"This investigation deals with the effect of insulation in limiting the temperature rise of the rooms in the upper storey of a building with a flat roof. For test purposes a structure was built on the roof of one of the buildings at the National Bureau of Standards.
Reference 27/109. Classification Pam. 699.86 :69.025.4.001.4.

SOIL mechanics.
London. Institution of civil engineers.
The principles and application of soil mechanics: a record of four lectures delivered at the Institution. London, Institution of civil engineers, (1948).
119 p. illus., diagrs.
The lectures are: Development and scope of soil mechanics, by L. F. Cooling; Earth pressure and the stability of slopes, by A. W. Skempton; Soil mechanics in foundations and excavation, by R. Glossop; Roads and airfields, by A. H. D. Marwick.
Reference 27/173. Classification Pam. 624.131(042).

TERRACRETE.
MacDONALD, Francis.
Terracrete: building with rammed earth-cement. (Chestertown, Author, c1939).
46 p. illus. (photos.), plans, diagrs., Mimeographed.
Reference 27/188. Classification Pam. 691.41.

WALLS.
Great Britain. Department of scientific and industrial research. Building research station.
. . . Cavity party walls for sound insulation. Garston, Building research station, 1948. (BRS, note A.15, 17/26/28).
3+p. illus., diagrs. Duplicated.
Reference 27/200. Classification Pam. 69.022.5 :699.844.1.

WOOD.
Timber development association, London.
Timber: a traditional material: a paper presented to the fourth congress of the Building industries national council; by Philip O. Reece . . . London, Timber development association ltd. (1947).
11 p. illus. (photos.), diagrs.
Reference 27/207. Classification Pam. 674 :691.11.

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.:

Electricity Supply Commission: Supply and completion at the Commission's Umtali power station, Industrial Site, Umtali, of the following: Steel frame buildings, control block, building requirements of the coal handling plant, etc., together with all necessary ancillary works. Contract 62/1948. Secretary, P.O. Box 377, Salisbury. (Deposit of £5-0-0 — extra copies of documents at 5/- each. Due, 18/1/49.

Public Works Department, Pretoria: Umtata, C.P. — office block for Departments of Agriculture, Forestry, Public Works, Health and Transportation Board. P.W.D. 129. Due, 16/12/48.

Public Works Department, Pretoria: East London, C.P. — additional accommodation for the Divisional Inspector of Labour. P.W.D. 131. Due, 23/12/48.

South African Railways Tender Board, Johannesburg: The erection and completion of new station buildings at Britstown, Cape Province. No. S.W.A. 12. Chief Civil Engineer, 102, Federated House, Loveday Street, Johannesburg. (Deposit of £2-2-0). Due, 6/1/49.

South African Railways Tender Board, Johannesburg: The construction (labour only) of reinforced concrete beam and slab-type bridge over certain rivers between Kelso and Port Shepstone Stations, South Coast Line, Natal. The approximate total quantities are: Earthworks —167,000 cubic yards; excavations — 1,320 cubic yards; concrete — 7,345 cubic yards; reinforcement (rod) — 260 Cape tons; reinforcement (rail) — 70 Cape tons. Chief Civil Engineer, 102, Federated House, Loveday Street, Johannesburg. (Deposit of £5-5-0). Due, 6/1/49.

ELECTRICAL EQUIPMENT, ETC.:

Barberton Municipality: Switch cubicles (equipped), Contract 8; Ironclad switch gear, Contract 9; 75 k.v.a. transformer, Contract 10; 150 k.v.a. transformer, Contract 11. Town Engineer, Barberton. Due, 18/1/49.

Bloemfontein Municipality: L.T. sub-station boards, pillar boxes and fuse units. City Elec. Engineer, Bloemfontein. Enquiry 14/1948. Due, 22/12/48.

Cape Town Municipality: Manufacture, supply and delivery of reinforced concrete poles and cross-arms for electrical transmission. Specification 1524/1948. City Elec. Engineer, Cape Town. Due, 31/12/48.

Cape Town Municipality: Transformers. Specification 1518/1948. City Elec. Engineer, Cape Town. Due, 5/1/49.

Cape Town Municipality: The manufacture, testing, supply and delivery of transformers. Specification 1513/1948. City Elec. Engineer, Cape Town. Due, 12/1/49.

Durban Municipality: Testing equipment. No. E. 2189. Electricity Department, Durban. Due, 7/1/49.

Johannesburg Municipality: Insulating sheets for switchboard panels. No. 688. City Treasurer, Johannesburg. Due, 17/12/48.

Kempton Park Municipality: Electricity extensions. Town Clerk, Kempton Park. Extended, 15/1/49.

Paarl Municipality: Certain line and electrical material. (No. E.D. 10/48). Electricity Engineer, Paarl. Due, 5/1/49.

Port Elizabeth Municipality: Transformers and steel poles. Specification 33L. City Elec. Engineer, Port Elizabeth. Due, 3/2/49.

Pretoria Municipality: 33 k.w. power cable. Specification 326. Controller of Stores and Buyer, Pretoria West. Extended, 3/1/49.

Pretoria Municipality: Two panel 33,000 v., 400 amp., rating metalclad oil-immersed isolator equipments. Specification 327. Controller of Stores and Buyer, Pretoria West. Due, 17/1/49.

Pretoria Municipality: 33 k.w. 20 m.v.a. transformers. Specification 325. Controller of Stores and Buyer, Pretoria West. Extended, 17/1/49.

Pretoria Municipality: Supply and delivery, installation and maintenance for a period of 12 months of supervisory remote control equipment. Specification 328. Controller of Stores and Buyer, Pretoria West. Due, 21/2/49.

South African Railways Tender Board: Telegraph material. No. 8004. Due, 6/1/49.

South African Railways Tender Board: Electrical cable, etc. No. 8410. Due, 30/12/48.

South African Railways Tender Board: Train lighting dynamos and cells. No. 7630. Extended, 6/1/49.

Uitenhage Municipality: Electrical material: Transformers, switch gear, cables and house service meters. Contract E.26. Buyer and Stores Controller, Uitenhage. Due, 4/1/49.

ENGINEERING CONSTRUCTION, ETC.:

S.A. Railways Tender Board: Wheels and axles, automatic couplers and roller bearing axle boxes. No. 7600. Extended, 6/1/49.

LABORATORY EQUIPMENT:

Johannesburg Municipality: Laboratory equipment. Contract 693. City Treasurer, Johannesburg. Due, 17/12/48.

Pretoria Municipality: Laboratory equipment (No. 2). Controller of Stores and Buyer, Pretoria West. Due, 4/1/49.

Union Tender and Supplies Board: Chemicals and laboratory apparatus to Western Province Fruit Research Station. S.O. 2962 Stellenbosch. P.O. Box 371, Pretoria. Due, 20/1/49.

ROADMAKING PLANT, ETC.:

Cape Provincial Tender Board, Cape Town: Major plant — National and Provincial roads: Up to 16 only panel vans with at least one ton (2,000 lbs.) payload capacity to the following specifications: (a) Heavy duty oil bath air cleaner on the engine; (b) Sump breather filter cap; (c) Governor set to give road speed of 35 m.p.h.; (d) Lock-up petrol tank cap; (e) 3-ton hydraulic jack; (f) All standard operator's tools, double-acting pump and tyre gauge in lock-up steel box attached to van; (g) All electric lighting and starting with at least 100 ampere-hour battery; (h) Thermostat in cooling system; (i) Shock absorbers on front and rear. F. 144/1948. **Item 2:** One only mobile fork crane of at least 3½ tons capacity suitable for workshop use and complying with the following essential specifications: (a) Must be equipped with pneumatic or solid rubber tyres; (b) Petrol or Diesel engine; (c) Minimum lift of fork 12 feet. Machine to be easily manoeuvrable with small turning radius. All controls operated from driver's seat. Provincial Roads Engineer's Department, Provincial Buildings, Cape Town. Due, 17/12/48.

Cape Provincial Tender Board, Cape Town: Concrete vibrators, centrifugal pumps, motor trucks, sheep's foot or tamping rollers, semi-trailer, crusher, patrol graders, tractors, winches, angledozers, rooters, self-loading scrapers, power excavators, air compressors, concrete mixers. F. 156/48. Provincial Roads Engineer's Dept., Provincial Building, Cape Town. Due, 7/1/49.

Johannesburg Municipality: 3-ton tipping trucks; ½-ton panel vans; ¾-ton panel vans; 5-ton trucks; motor cycles. Contract 706. City Treasurer, Johannesburg. Due, 17/12/48.

Johannesburg Municipality: 3-ton truck chassis and cab; 3 and 5-ton tower wagons. Contract 695. City Treasurer, Johannesburg. Due, 17/12/48.

S.A. Railways Tender Board: Crawler Tractors with bulldozers. No. 8505. Due, 13/1/49.

Van Rhynsdorp Divisional Council: One Diesel truck of

Umtali Municipality: Certain quarrying and road-making equipment all erected and tested in terms of tender documents. Contract C. 24/1948. Town Engineer, Umtali. Due, 18/1/49.

Union Tender and Supplies Board, Pretoria: Motorised road graders to Department of Native Affairs at various places. S.O. 3085. Due, 30/12/48.

not less than 8½ tons (17,000 lbs.) net payload carrying capacity, equipped with heavy-duty all-steel (3/16-inch) hydraulic tipping body of 5 cubic yards struck capacity to conform with dimensions and specifications. Secretary. Due, 15/12/48.

WATER SUPPLIES, ETC.:

Bloemfontein Municipality: 30″-bore rising main. 53,000 feet, app., of various classes of 30″-bore protected steel pipes with non-caulked joints, special pipes, bends, 20″ sluice valves, electrically operated 12″-bore sluice valves, air valves, alarm system, depth indicators, Venturi-type water meters, recording from 10,000 to 500,000 gallons per hour and certain quantities of special 20″-bore "victaulic" jointed pipes and "victaulic" rubber sealing rings to match existing pipes. City Engineer, Bloemfontein. (Deposit of £10-0-0—extra complete sets of documents at £3-3-0 per set). Contract 1-48/49. Parts A.B.C.D. and E. Extended to 1/2/49.

Irrigation Department, Pretoria: One filtration plant. Irr. 301. Controller of Stores, P.O. Box 277, Pretoria. Due, 16/12/48.

Irrigation Department, Pretoria: One electrically-driven centrifugal pump with starting equipment. Irr. 300. One electrically-driven borehole-pumping plant. Irr. 361. Due, 30/12/48.

Irrigation Department, Pretoria: Two complete purification plants. Irr. 360. Due, 23/12/48.

Kimberley Municipality: Equipment for the cleaning of water mains from 18″ to 3″ in diameter, in situ. Waterworks Engineer, Kimberley. Due, 13/12/48.

Rand Water Board, Johannesburg: Additional water supply (1946) scheme: Supply, delivery, erection and putting into service of one electric motor-driven induced draught fan at the Board's Vereeniging pumping station, No. 2 boiler house. (Deposit of £3-0-0—additional copies of documents at £1-0-0 per copy). Chief Engineer, 3, Fraser Street, Johannesburg. Contract 720. Due, 4/1/49.

Stanger Municipality: Hydro-electric plant and penstock, E. 1/1948; construction of dam, tunnel and head works, E. 2/1948. Town Clerk, Stanger. Extended, 17/1/49 and 5/1/49.

Umtali Municipality: Water scheme — 14″, 10″, 9″, 6″ and 4″ diameter pipes and fittings (excluding valves). Contract OW. 1/1948. (Deposit £10-10-0 and extras £5-5-0). Consulting Engineers: Stewart, Sviridov & Oliver, 66, Commissioner Street, Johannesburg. Due, 6/1/49.

Witbank Municipality: Water scheme: Supply, delivery and erection of balanced needle valves and jet dispersers. Contract W. 10/1948. (Deposit of £3-3-0—extra copies of documents at £2-2-0 each). Consulting Engineers: Stewart, Sviridov & Oliver, 66, Commissioner Street, Johannesburg. Due, 22/12/48.

MISCELLANEOUS:

Artists' water colour paint brushes: Provincial Accountant, P.O.B. 11, Pietermaritzburg. Due, 5/1/49.

Automatic change-over units for radio beacons to Dept. of Transport. S.O. 3084. Union Tender and Supplies Board, P.O. Box 371, Pretoria.

Bedsteads: Natal Provincial Tender Board. Provincial Accountant, P.O.B. 11, Pietermaritzburg. Due, 5/1/49.

Binoculars, office clocks and pegamoid to S.A. Police: S.O. 3087, Pretoria. Union Tender & Supplies Board, P.O. Box 371, Pretoria. Due, 23/12/48.

Bogie wagons: S.A.R. Tender Board. No. 7698. Due, 13/1/49.

Bolts: Department of Posts and Telegraphs, Pretoria. P.O. 1005. Due, 13/1/49.

Borehole testing equipment: No. 8298. S.A.R. Tender Board, Johannesburg. Due, 10/2/49.

Brass rod, phosphor bronze and copper tubing: Controller of Stores, Cape Town. F. 150/48. Due, 14/12/48.

Bridge work: S.A.R. Tender Board. No. 8412. Due, 27/1/49. No. 8184. Due, 3/2/49.

Cable carts: Dept. of Posts and Telegraphs, Pretoria. P.O. 1009. Due, 13/1/49.

Canvas: S.A.R. Tender Board. No. 8497. Due, 13/1/49.

Cast iron pipes and specials, 9″; concrete spun pipes, 9″: City Engineer, Cape Town. A. 81/48. Due, 15/12/48.

Commutators for tramcar traction motors: City Treasurer, Johannesburg. Contract 699. Due, 20/12/48.

Concrete poles: S.A.R. Tender Board. No. 8493. Due, 23/12/48.

Crushing plants: Transvaal Provincial Tender Board. No. 336/1948. Controller of Provincial Stores, P.O. Box 857, Pretoria. Extended, 29/12/48.

Curtains for library theatre: City Treasurer, Johannesburg. Contract 696. Due, 21/12/48.

Diesel electric shunting engine: S.A.R. Tender Board. No. 7253. Extended, 10/2/49.

Drilling machines: S.A.R. Tender Board. No. 8444. Due, 20/1/49.

Drilling machines: S.A.R. Tender Board. No. 8442. Due, 27/1/49.

Drugs and surgical sundries: Provincial Accountant, P.O. Box 11, Pietermaritzburg. Due, 26/1/49.

Electric button-hole machine: Contract 723. City Treasurer, Johannesburg. Due, 22/12/48.

Engine weighing machines: S.A.R. Tender Board. No. 8434. Due, 17/12/48.

Fencing material: Controller of Provincial Stores, P.O. Box 857, Pretoria. No. 352/1948. Due, 22/12/48.

Fencing material (wire): F.158/1948. Cape Provincial Tender Board. Due, 17/12/48.

Fire extinguishing equipment, carbon dioxide: City Elec. Engineer, Port Elizabeth. Specification 329. (Duplicate copies of tender documents on deposit of 10/6 — extra copies at 10/6 each). Due, 6/1/49.

Fire extinguishers: S.A.R. Tender Board. No. 8376. Due, 17/12/48.

Fire pots: Dept. of Posts and Telegraphs. No. P.O. 1010. Due, 6/1/49.

Floodlight fittings: City Treasurer, Johannesburg. Contract 721. Due, 21/12/48.

Galvanised stay wire, 300 coils 1.14 S.W.G.: Controller of Stores and Buyer, Pretoria West. Due, 15/12/48.

Gas piping: City Treasurer, Johannesburg. Contract 719. Due, 21/12/48.

Gear wheels, pinions, armature shafts: S.A.R. Tender Board. No. 8303. Due, 13/1/49.

Hand tools: Cape Provincial Tender Board. F. 154/48. Controller of Stores, Cape Town. Due, 14/12/48.

Hydraulic presses: S.A.R. Tender Board. No. 8439. Due, 27/1/49.

Laundry equipment: Secretary/Treasurer, Cape Hospital Board, 6, Dorp Street, Cape Town. Required at the Board's laundry, Portswood Road, Green Point. Due, 17/12/48.

Laundry plant: Transvaal Provincial Tender Board, P.O. Box 1040, Pretoria. No. 331/1948. Due, 22/12/48.

Linoleum: S.A.R. Tender Board. No. 8481. Due, 20/1/49.
Machine tools: S.A.R. Tender Board. No. 8452. Due, 20/1/49. No. 8454. Due, 27/1/49.

Malleable cast iron base locking plates for coin boxes: Dept. of Posts and Telegraphs, Pretoria. P.O. 1007. Due, 6/1/49.

Mild steel plates: Controller of Stores, Irrigation Department, P.O. Box 277, Pretoria. Irr. 401. Due, 6/1/49.
Oil purifier: City Treasurer, Johannesburg. Contract 697. Due, 17/12/48.

Paper and boards: Government Printer, Pretoria. G.P.-P. 36. Due, 13/1/49.

Paper: Government Printer, Pretoria. G.P.-P. 37. Due, 30/12/48.

Pick handles, universal type: Dept. of Posts and Telegraphs, Pretoria. P.O. 1008. Due, 13/1/49.

Pig lead: City Treasurer, Johannesburg. Contract 698. Due, 21/12/48.

Planing and moulding machine: S.A.R. Tender Board. No. 8457. Due, 20/1/49.

Plate-bending rolls: S.A.R. Tender Board. No. 8449. Due, 20/1/49.

Plumbing and sanitary material: Transvaal Provincial Tender Board, P.O. Box 1040, Pretoria. No. 359/1948. Due, 15/12/48.
Polish machines and grinders: S.A.R. Tender Board. No. 8181. Due, 30/12/48.
Presses: S.A.R. Tender Board. No. 8176. Due, 30/12/48.
Radio beacons for the Division of Civil Aviation at various centres: Union Tender and Supplies Board, P.O.
Rotary broom trailer and blower: Transvaal Provincial Tender Board, P.O. Box 1040, Pretoria. No. 365/1948. Due, 29/12/1948.
Box 371, Pretoria. S.O. 3042. Due, 23/12/48.
Rotary hoe: City Treasurer, Johannesburg. Contract 704. Due, 20/12/48.

Shoes for non-European nurses: City Treasurer, Johannesburg. No. 703. Due, 17/12/48.

Slat conveyors: S.A.R. Tender Board, Johannesburg. No. 8562. Due, 27/1/49.

Station wagons: City Treasurer, Johannesburg. Contract 700. Due, 20/12/48.

Steam kitchen and electrical equipment for Wentworth Hospital: Provincial Accountant, P.O. Box 11, Pietermaritzburg. Due, 15/12/48.

Steel reinforcement: City Treasurer, Johannesburg. Contract 701. Due, 20/12/48.

Super-heater flue and boiler tubes: S.A.R. Tender Board. No. 8474. Due, 3/2/49.
Street name plates, mounting poles and brackets or pole heads: Town Engineer, Umtali. C.C. 23/1948. Due, 13/12/48.
Telegraph line material: S.A.R. Tender Board. No. 8199. Due, 3/2/49.
Train lighting material: S.A.R. Tender Board. No. 8354. Due, 23/12/48.
Water piping — 1″, 1½″, 3″, 4″ and 6″: City Treasurer, Johannesburg. Contract 702. Due, 17/12/48.
Welding machines: S.A.R. Tender Board, Johannesburg. No. 8458. Due, 27/1/49.
Wood sawing machines: S.A.R. Tender Board. No. 8453. Due, 6/1/49.

N.B. — Further information regarding S.A.R. Tenders Nos. 8439, 8442, 8453 and 8457 can be obtained from Chief Stores Superintendent, 203, Park Chambers, Rissik Street, Johannesburg.

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Series DIS-1.

INFORMATION SHEET

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

In introducing a series of publications framed on the lines of "Questions and Answers", published by the Information Bureau of the Building Research Station, Watford, it is the wish of the Institute to draw the attention of practical men to developements in the Building Industry which it is sure will be of interest to them. The questions have been selected very largely from inquiries which have been received by the Institute from outside bodies and in answering these inquiries the Institute has attempted to present the best reply it can in the light of existing information.

It is appreciated that many questions do not lend themselves to a complete answer and in fact it is most probable that with the course of time and increasing knowledge the answers may be modified.

This series of Information Sheets will be published by the Council for Scientific and Industrial Research and by the courtesy of various building journals it is hoped to include these sheets as loose papers inside their publications. Certain binding facilities are being provided and those individuals wishing to maintain a record of these publications may bind the individual papers in a convenient loose leaf form.

It is the intention to put out these papers at regular intervals and a consecutive numbering for the questions has been correspondingly adopted.

J. E. JENNINGS.
Director: National Building Research Institute.

No-fines Concrete

1. Q: Is the use of no-fines concrete satisfactory for walling purposes?

   A: Experience over the last 25 years has indicated that no-fines concrete can provide a very suitable walling material provided certain precautions are observed. It has thermal properties very similar to brick-work and has an adequate rain resistance character. It should be borne in mind, however, when considering the use of no-fines concrete that for average bungalow construction, the walling factor accounts for only 15 to 20% of the total cost, and consequently when using this material no overriding economics can be expected unless other components of the building are also taken into account. The process appears to lend itself best to mass produced houses where opportunities for better site organisation exist.

Reinforced Brickwork

2. Q: Under what conditions can reinforced brickwork be used in buildings?

   A: Reinforced brickwork is finding an ever-increasing application for lintels and other load-bearing sections of a building. It has advantages over concrete in that unsightly shrinkage and thermal cracking is avoided and in addition the use of side shuttering is eliminated. The theory underlying its use is similar to that applied for reinforced concrete and a British Standard 1146:1943 summarises and outlines the procedure very satisfactorily.

Turf Foundations

3. Q: How should foundations on black turf be constructed to obviate cracking of the buildings?

   A: No conclusive evidence is available on this subject but various methods have

been tried by a number of authorities with limited success. None of these methods appear to have universal application. Level observations taken by this Institute have shown that very frequently buildings on these clays show a rise instead of a settlement. The central portion of the building appears to rise more than the rest of the building and the resultant cracks give the impression that the corners have dropped. Preliminary work on the problem indicates that the load intensities on the soil should be kept high and footings should be carried as deep as practicable.

Efflorescence of Brickwork

4. Q: What is efflorescence and how can its effects on brickwork be overcome?

A: Efflorescence is the name given to the damage caused to porous fired clay products (tiles, bricks etc.) by water-soluble salts crystallizing within the pores of the material. Often the salts are visible as a white scum on the surface of the brickwork and the chief damage is marred appearance. In more serious cases the force exerted by the salts in crystallizing will cause flaking of the face of the brickwork. In these cases the bulk of the salts is to be found underneath the brick surface. Successive wetting and drying of the brickwork repeats the process, causing decay of the bricks.

Two factors are necessary to cause efflorescence — dampness and the presence of soluble salts. Attention to damp-proof courses; plumbing fillings which may leak or cause condensation of water from the air; roof guttering etc., will prevent the dampness. In respect of the bricks, from which the salts often arise, well-burnt bricks are advised. In important cases the testing procedure of the British Standards Institute may be followed. Salts which may have been present in the raw materials of brickmaking are removed to a large extent by hard firing which also produces a brick of lower porosity and one resistant to the disruptive forces set up by crystallizing salts.

Prevention is the essence of avoiding troubles due to efflorescence. Cures are limited to removing the visible scum with a wire brush during dry periods. Application of chemicals — often advised — is not recommended.

Soil-cement Bricks

5. Q: What soils are suitable for the manufacture of soil-cement bricks and how should they be made and used?

A: Observations and work by the Institute have indicated that the type of soil used has far reaching effects on the quality of the bricks. If the soil used contains too much clay, the structure is likely to exhibit cracks. It is recommended that the soil be tested by a competent laboratory before use because only by using a suitable soil can freedom from cracking and a long life be ensured. For the best results the moisture content at which the bricks are made should be carefully controlled and they should be allowed to cure in a cool, damp environment for at least a week and should then be allowed to dry out thoroughly before being incorporated in the structure. Conventional plasters and mortars may be used. In laying, the minimum amount of soaking compatible with easy laying should be practised as the excessive wetting of soil cement bricks may result in shrinkage cracks on drying out. This is particularly important where the soil used contains clay.

In designing structures where soil-cement bricks are used in load bearing walls, it should be borne in mind that soil-cement bricks are considerably weaker than good quality burnt bricks, especially when wet. Consequently much lower loads can be permitted owing to the comparative friability of soil-cement bricks. Paint on local loads should be distributed by adequate design precautions.

W.P.—64063—8/10/8/48