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SOUTH AFRICAN ARCHITECTURAL RECORD

THE JOURNAL OF THE CAPE, NATAL, ORANGE FREE STATE AND TRANSVAAL PROVINCIAL INSTITUTES OF SOUTH AFRICAN ARCHITECTS AND THE CHAPTER OF SOUTH AFRICAN QUANTITY SURVEYORS.

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From "the Architectural Review," July, 1941.

THE PATTERN OF WAR

The western towers of St. Pauls surmounting the sea of devastation lying to the north of the Cathedral

BLUE PRINTS OF POST-WAR BRITAIN

SCHEMES FOR TOWN AND COUNTRY PLANNING WHEN THE NATION MOVES FROM WAR TO PEACE.

RE-BUILDING A PRIORITY

By Dr. F. KESSLER.

Among Britain's widely discussed plans for the post-war era, those affecting town planning are already of major importance. Town planning, indeed, may well become the first important source of employment, at the very outset of the period of transition from the conditions of war to the conditions of peace.

Moreover, the widespread destruction of buildings during innumerable air raids makes reconstruction and reorganisation an imperative priority, and it is apparent that the task must be within a comprehensive legal and technical framework.

Britain's Government recognised these conditions by its decision, some months ago, to create a separate Ministry of Town and Country Planning. The appropriate Minister has now established his department and, as the title indicates, he is to supervise country planning as well as the rebuilding of the war scarred towns.

Meanwhile, there is the Scott Report, dealing with the development of Britain's rural and agricultural areas. Its main intention is to restrict, by various controls, the chaotic expansion of industry and to prevent the haphazard influx of people from the towns. In particular is "ribbon development"—the unorganised growth of towns into rural areas—to be checked.

RE-MAKING BOMBED CITIES.

There already exist many blueprints and designs on which town planning will be based. The pre-war figure was 13 million dwelling houses. 2,750,000 have been damaged by air raids and about 2,500,000 are already repaired. To the air raids must be added the fact that the entire building of new houses has been at a standstill for nearly four years.

Merely to achieve pre-war figures would therefore involve a vast programme. But town planning sees in the reconstruction of bombed cities and the making up for four lost building years only the opportunity for the realisation of much more ambitious goals.

The Government is studying the various schemes which have been submitted. But the Government itself recently put forward a sober and practical plan which represents the most important provision for the demobilisation period hitherto drawn up.

TEN YEAR BUILDING PLAN.

It is a ten year building plan to fit the building industry for the coming tasks. The plan shows that a considerable expansion of building—which before the war absorbed more than one third of the expenditure on capital goods and is one of the most important and versatile instruments of employment of labour—is anticipated. The plan provides for securing by special training an army of building workers of some 1,250,000—a figure which exceeds the pre-war average by 200,000. The Government plans, of course, for full employment. That allows for an increase in output by 50 per cent., particularly when considering the progress in prefabrication, standardised construction and other improvements.

The number of building workers corresponds to an output value of some 600 million pounds, not including public works. Taking the pre-war proportions of the various sectors of building, this would suffice for the erection of 500,000 dwelling houses per year as against a pre-war average of 350,000.

Evidently this increase in numbers alone secures an appreciable amelioration of housing conditions. Despite demobilisation, the Government anticipates a labour shortage.

EDUCATING THE CRAFTSMAN.

For this reason, it intends to educate 200,000 craftsmen by means of special adult training during the first three post-war years. The labour question solved, the building industry can resume its activities more easily and sooner than many others since it is almost independent of imported materials. It is taken for granted that a substantial proportion of future building will be financed by the Government, but the actual task of construction will remain within the province of private enterprise.

But any speculative jerry building, which was rather frequent in pre-war terms will be made impossible, probably by the

fixing of certain standards of quality. The construction of 3,000 cottages for farm workers by the State, at present under way, is carried out on utility lines. These cottages, with all modern amenities, will in general take up a great part of future house building.

The funds needed for these plans will be available. The Government has emphasised its firm resolution to continue at all events the policy of cheap money. Despite the doubling of the public debt since the outbreak of war, the Government succeeded in lowering the credit cost to less than two per cent. as against three per cent in 1939, and this well tried monetary policy will also be put to the service of the peace economy.

In this connection, the enormous accumulation of capital reserves should not be forgotten ; savings have increased by more than 5,000 million pounds, 33 per cent. of which represents small savings.

But there are other sums accumulated directly for building purposes. It is understandable that companies and firms whose war profits are entirely taxed away by the excess profits tax are grasping every opportunity to accumulate reserves which the tax authorities allow. The new Budget envisages further concessions in order to enable the firms to carry out after the war repairs and improvements which are recognised as necessary but must be postponed under present conditions.

CONTROLLED RECONSTRUCTION.

Already, since last year, one fifth of the excess profits tax is regarded as post-war credit provided the companies use it exclusively for productive investments. In the same way, the nest eggs allocated to wage earners out of their income tax, which already amount to a total of about £300,000,000 will help hundreds of thousands to realise their dreams of moving into small new houses with gardens.

But what about town planning in the sense of the word which starts only at the point when the economic and financial prerequisites have been fulfilled ? The Government is now considering findings of the pre-war Barlow Royal Commission and of the Uthwatt Committee which reported in September, 1942.

A well ordered decentralisation of big towns, the breaking up of conglomerations and the prohibition of chaotic growth is envisaged, and towns will be planned in such a way as to enable people to live not too far from their work, yet in healthy and pleasant surroundings.

Many important towns, particularly those affected by air raids, have submitted their own plans, which take into account their own requirements, but in their general outlines follow closely the main ideas sketched above. All these single plans advocate not only a centrally and nationally directed and controlled programme of reconstruction, but also far reaching and sometimes radical changes and reforms. At the same time, they recognize that existing conditions cannot be simply ignored. There is a straight line from this conception to the typical constructive character of town planning although the latter is much concerned with the pickaxe and demolition squad. Town plans, and other plans as well, do not claim that the total destruction which exists now is the first and foremost condition for construction and reconstruction.

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CITY GOVERNMENT

A CRITICAL STUDY OF THE MACHINERY AND PRINCIPLES OF LOCAL SELF-GOVERNMENT, WITH SPECIAL REFERENCE TO CAPETOWN

By K. Hall Gardner

This is the completion of Volume One of an Architectural Thesis, "A City Hall for Capetown."

CHAPTER III.

THE MUNICIPAL MACHINE

"City-Government . . . the uninspired and uninspiring multitude store from which, as there is no alternative, the citizens must purchase such unappetising commodities as drainage and sewage disposal."
—J. P. R. Maud.

THE VARIOUS AUTHORITIES IN SOUTH AFRICA; SPHERES OF RESPONSIBILITY.

THE UNION GOVERNMENT:—

Agriculture and Forestry,
Archives,
Births and Deaths (registr.),
Censorship,
Census,
Commerce and Industries,
Customs and Excise,
Defence (Dept. of),
Education (Dept. of),
Finance,
Food inspection, control,
Fisheries (Director of),
Health (Dept. of),
Immigration,
Irrigation,
Justice (Magistrates, Courts),
Labour (Dept. of),
Land (Dept. of),
Legislation,
Mines (Dept. of),
Native Affairs,
Pensions,
Police,
Posts, Telegraphs and Telephones,
Prisons,
Railways, Airways and Harbours,
Survey (Surv.-Gen.),
Taxation (Income),
Weights and Measures.

THE PROVINCIAL COUNCILS:—

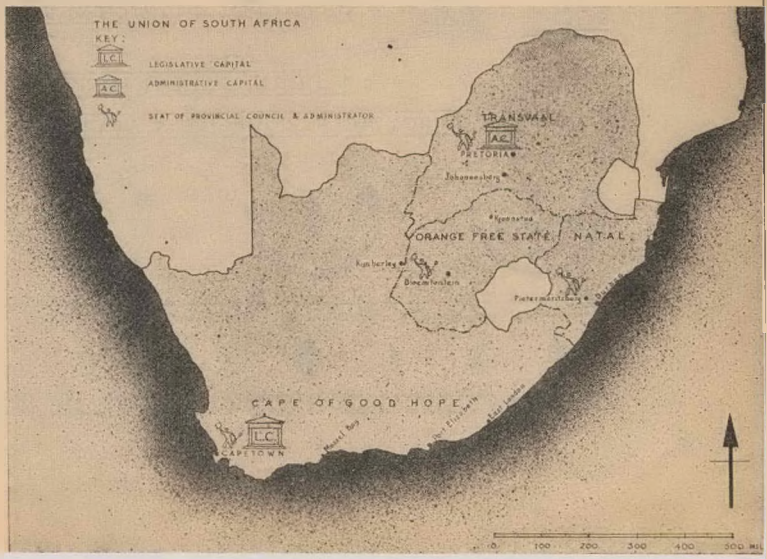
Administration,
Commissions,
Education (Supt.-Gen.),
Game and Fish Preservation,
Hospitals, Clinics, and Homes,
Licensing (motor-vehicle),
Racing and Betting Regulations,
Regulations governing Shop Hours, and Public Entertainments.
Roads and Bridges,
Taxation (Personal; Prov. income),
Vermin Extermination.

CITY MUNICIPAL COUNCILS:—

Abattoirs,
Art Galleries,
Beaches,
Building Regulations,
By-laws,
Cemeteries,
Children's Playgrounds,
Civilian Protective Services,
Drainage,
Electricity,
Fire Brigade,
Gardens,
Gas Supply,
Health (M.O. of),
Housing (sub-econ.),
Libraries (minor),
Licensing (trades, animal, etc.)
Markets,
Museums (minor),
Musical direction,
Open spaces,
Parks,
Pavilions (seaside),
Pensions (municipal),
Public Works,
Publicity (tourist),
Rates and Taxes (property),
Roads (constr. & maintenance),
Sewage Disposal,
Sports Grounds,
Streets (lighting, cleaning, etc.),
Swimming Baths,
Town-planning,
Traffic Control,
Water Supply.

NOTE 1.—This list is merely indicative of the activities of the various authorities, and is not intended to be exhaustive.

NOTE 2.—Divided responsibility has resulted in the comparative neglect of the broader issues of National Planning, Town-planning in the creative sense, Regional Surveys, Agricultural co-ordination, and the Zoning of Industry.



THE UNION OF SOUTH AFRICA.
A map showing the disposition of the governmental authorities.

GERMAN SYSTEM OF LOCAL GOVERNMENT.

"Men will submit to any rule by which they may be exempted from the tyranny of caprice and of chance. They are glad to supply by external authority their own want of constancy and resolution, and court the government of others, when long experience has convinced them of their own inability to govern themselves."—Dr. Johnson, 1773.

Up to 1933 the majority of German cities were governed under the Burgomaster System which consisted of a deliberative council of amateurs, with an executive body of professional administrators with a Burgomaster (as often as not a life-appointment) as their head. Not only was the Burgomaster the head of the executive body, but he was also the chairman of the council (with power of veto over its decisions), and an official of the national government, responsible for the administration of certain state and national laws and decrees; his position therefore was one of extreme power, and the successful government of any city depended on the qualities of its burgomaster. Other cities tried the Magistrat System, in which the place of the burgomaster and administrators was taken by an executive Magistrat (partly amateurs and partly professionals), each member thereof being in charge of a particular department (finance, law, public works, health, etc.). A staff of experts was appointed to put into effect the decisions of the Magistrat. As the executive held a veto over findings of the councils on matters of policy, and the council in turn spent much of its time considering details of administration, much delay and duplication resulted from this division of responsibility, and the system fell into disfavour. Both these systems, in spite of being more complex than the present South African system, were more efficient as they relied more upon

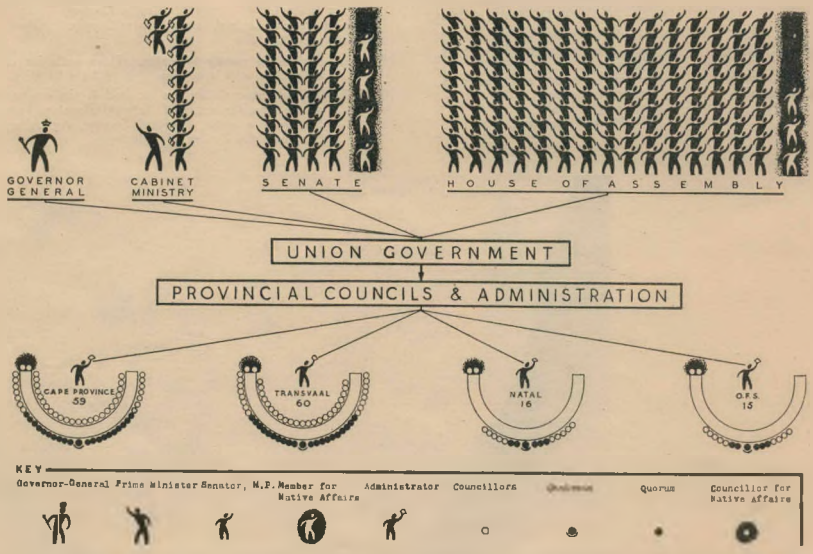
THE CONSTITUTION OF THE UNION OF SOUTH AFRICA

Governor - General represents His Majesty the King. Has the power of veto over Parliament, never used in practice.

Cabinet Ministry (12 members and 1 without portfolio) is formed by the Prime Minister. Decides administrative policy.

Senate (40 Members plus 4 for Native Affairs) is chosen thus:—8 Members elected from each Province by its Council and by its M.P.'s, 8 Members nominated by Governor-General-in-Council (4 for their understanding of Native interests). 4 Members elected by Native vote.

House of Assembly (150 Members plus 3 for Native Affairs) is directly elected by popular vote in the Provinces, thus:—Cape Province, 59, Members; Transvaal, 60; Natal, 16; O.F.S., 15; Native vote 3. All European Union Nationals over 21 (and non-Europeans in the Cape and Natal, subject to property qualifications and education) may register as Parliamentary votes. Members for Native Affairs chosen under "Native Act" of 1936. Together with Senate, House of Assembly forms Parliament which passes all legislation (sitting at least once a year in Capetown) and supervises administration (in Pretoria).



NOTE.—Provincial Administrators are chosen by Governor-General-in-Council. Each Provincial Council has the same members of elected members as represents the province in the House of Assembly, plus 2 Members for Native Affairs.

THE CAPE PENINSULA.

THE SHADED AREA ILLUSTRATES THE EXTENT OF THE MUNICIPAL AREA OF CAPE TOWN.



the efforts of professional administrators. They had, however, the disadvantage of being less democratic and more liable to abuse in the hands of party politics.

Since the National-Socialist Revolution of 1933 the State has assumed responsibility for governing the cities. It appoints a Burgomaster from a list (seldom more than three names) submitted by local Nazi-party leaders. Town councillors are appointed by the Burgomaster on the advice of the said party leaders. The council is purely an advisory body without any powers regarding determination of policy. The Burgomaster disposes of all local revenue as he thinks fit, subject only to the approval of two superior State officials. The three leading principles of Nationalsozialistortsselbstregierung (as it is officially called) are clearly defined as loyalty to the Reich, the supremacy of Reich law, and political education. The system would not suit South Africa.

AMERICAN SYSTEMS OF LOCAL GOVERNMENT.

The oldest American system of city-government is that known as the Mayor-Council System, which is in many ways a small-scale replica of the contemporary State and Federal Governments. It is composed of an elected council of amateurs, and a separately elected, salaried Mayor as the chief executive officer of the city, with powers (in the "strong-mayor" cities such as New York) even greater than those of the pre-1933 German burgomaster. The Mayor, however, is primarily a politician and not an expert in the technique of administration, the actual carrying out of which is left in the hands of an elected staff of heads of departments. The idea behind this system is that the separately elected deliberative and executive powers (i.e., the Council and the Mayor) should check and balance each other, thus safeguarding individual liberty. In practice, however, it tends to result

in either collusion or stalemate, according to whether the two powers in question are of the same political party or not.

This resulting inefficiency has led many cities to adopt the Commission system which consists of a single small body[1] of elected salaried Commissioners, each in charge of a particular department of city-government, and all collectively responsible for all points of both policy and administration. Thus for the first time the old distinction between deliberative and executive duties disappears. Criticism of the undemocratic nature of the system has been met by the introduction of three constitutional devices namely the "Referendum" (voters' approval to be obtained on important measures), the "Initiative" (voters may insist by petition that some particular action should be taken), and the "Recall" (voters may dismiss any unpopular commissioner). The fault of lack of leadership remains, however, and tends to result in inter-departmental rivalry and lack of co-ordination.

In recent years a new system, that of the Council-manager, has been supplanting the Commission system in many American cities. Here a small, elected, deliberative council appoints a City-manager (usually an experienced professional administrator) who prepares the budget and directly co-ordinates the executive work of a staff of departmental heads appointed by himself. The City-manager may be dismissed by the Council at any time, but the average tenure of office is five years or more. City-management is rapidly becoming a recognised profession, and in his lifetime a good City-manager, unlike a mayor, may give the benefit of his accumulated experience to many cities in succession. As he is primarily a technician with an objective attitude towards city-government, there is some chance of his being politically disinterested. Of all the systems discussed above that of the Council-manager seems to hold out most hope for South Africa, its virtue being that the Council and the City-manager form an organic whole, with clear division of labour but unified responsibility, while retaining balance and efficient co-ordination of the various departments, and being fully in accord with democratic principles.

RACE AND CLASS DIFFICULTIES IN CAPETOWN.

Any government of Capetown must attempt the impossible in the form of a perfectly harmonious reconciliation of the clashing interests of a heterogenous population of approximately 150,000 English-speaking and Afrikaans-speaking Europeans, and approximately 150,000 Natives, Indians, Asiatics, and Coloured people ; all of mixed descent and over an exceptionally wide range of financial and educational class or standing. Nevertheless the attempt must be made, just as the Provincial Governments must reconcile the varying interests of urban and rural districts ; the Union Government those of the provinces ; and some future World Government those of the nations ; if we are not to be engulfed perpetually in the chaos which is the penalty of the each-man-for-himself anarchy.

VOTING ; THE NATURE OF THE ELECTORATE.

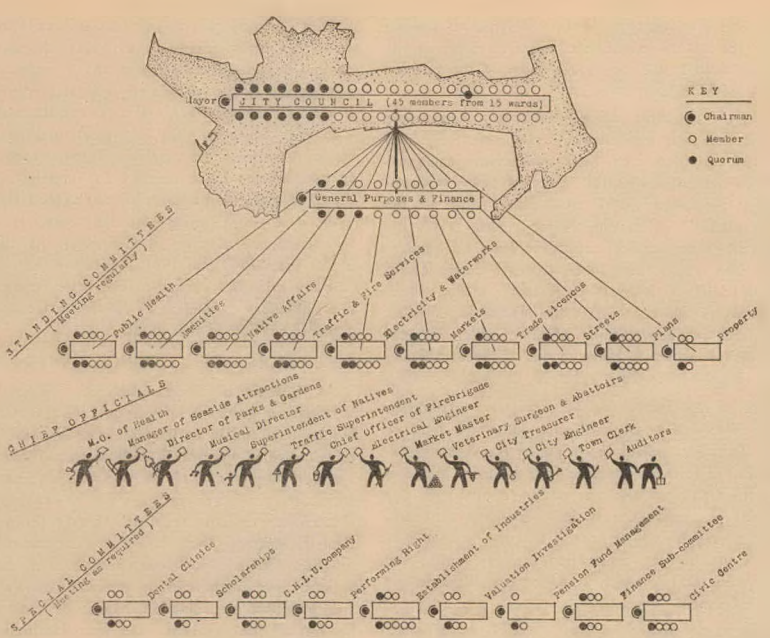
No attempt is made in Capetown to identify the local electorate with the local taxpayers. This is obvious from the facts that the main source of revenue for municipal expenditure is the fixed property tax ; that the occupiers of fixed property are not taxed thereon ; and that the vote is available to Europeans with extraordinary ease (any European Union National over 21), and without sex-discrimination. It is right that no such attempt should be made, especially in the case of Capetown with its comparatively small percentage of propertied inhabitants, and in spite of the frequently advanced but fallacious argument that the right to vote in municipal elections is not a political right, but is an incident of property-ownership in the municipal area. It is more than a political right ; it is a fundamental social right.

Non-Europeans, as such, are not excluded from the franchise in the Cape Province, but must attain certain educational and property qualification. Few attain the educational standard (there being no free State-run non-European schools), and the remainder are too busy getting drunk, dodging policemen, or trying to earn a living by honest means, to bother about city-government or their rights ; the nett result being that the non-European section of the community is virtually unrepresented. The only way for Natives, for instance, to ventilate grievances or influence policy is through an advisory board whose chairman (a municipal official) is supposed to convey their views to the Natives Affairs Committee of the Council—a system clearly designed to give the illusion only of representation. (See p. 34.)

If the non-European section of the community is not to be given true proportional representation (and the chances that it will are very remote indeed), the privileged section must realise and accept the full responsibilities of their trusteeship (see p. 34), particularly in the sphere of municipal activity in the provision of such essentials as water, sanitation, lighting, sub-economic housing, and transport.

CAPETOWN'S CITY-GOVERNMENT ; THE POWERS THEREOF

Capetown's City-government consists of a City Council (a body of 45 amateurs simultaneously elected by the citizens of 15 wards) which chooses one of its number as chairman with the title of Mayor, and another as Deputy-Mayor. The Mayor is primus-interpares, with no more constitutional power than any other Councillor, and though he is socially the first citizen of the city, he is definitely not a leader in the sense of the American mayor or the pre-1933 German burgomaster.[2] The Council appoints an executive staff of civil servants (who are salaried professionals) to put its policy into effect. This executive staff is entirely subordinate to the Council, on whose shoulders all responsibility for governmental policy and its execution eventually rests. The powers of the Council in the municipal area have been gradually derived from particular



THE ORGANISATION OF THE CAPETOWN COUNCIL

enactments of the Union and Provincial legislatures, and apart from its obligation to see that certain national laws and interests are observed, the City-government of Capetown is completely self-contained, and is free from restriction or encouragement by (and from paying dues to, or receiving grants from) any central national authority such as Ministry of Health of the type found in England. As compared with the English or the pre-1933 German systems, this independence has resulted in greater efficiency in jurisdiction, co-ordination of the essential municipal services, and ease of extension of area of jurisdiction; at the expense, however, of the philanthropic side, such matters as education, poor-relief, and cultural duties tending to be neglected. The remedy to such faults lies, not in setting up central ministries of the English type at the sacrifice of efficiency, but in the inculcation of civic pride in the electorate through the media of the schools, universities, and newspapers (see p. 35) and conceivably, by the influence of a good "City-manager." Another result of Capetown's civic independence has been that the Council has had to finance its activities almost entirely by itself, the city budget having been balanced in recent years by making definite profits on trading undertakings such as electricity and making sewage and sanitary services pay for themselves, the remainder (more than half the total revenue) being made up by a tax at a suitable rate on the assessed value of fixed property.

COUNCILLORS; QUALIFICATIONS, ELECTION.

> "Why, Sir, in such a government as ours, no man is appointed to an office because he is the fittest for it, nor hardly in any other government; because there are so many connections and dependencies to be studied. A despotick prince may choose a man to an office merely because he is the fittest for it. The King of Prussia may do it."—Dr. Johnson, 1772.

The qualifications for candidature for municipal elections are broadly speaking the same as those for the right to vote. Thus the electorate can hardly complain that its choice is unduly limited. As well as the candidates who are prepared to favour the interests of (and hand out municipal jobs to) any group of citizens who will put them into power, there are, and always will be, public-spirited and personally disinterested men and women who feel it their duty to stand

for election ; and if at present the former type is favoured, it is the result of lack of unselfishness and civic pride on the part of the electorate, and no improvement in the position is possible by constitutional means.

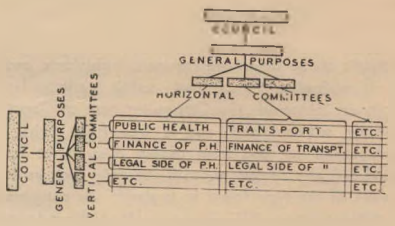
The majority of councillors, being business-men, can devote to their public work only such time (in many cases very little indeed) as they can spare from their own private callings—a disadvantage that outweighs the fact that being business-men they may be considered to have their "finger on the pulse of the public." The only remedy, apart from the doubtful alternative of drawing councillors from the present leisured class only, would seem to be to make councillorship an adequately salaried full-time profession ; a step which would incidentally render unnecessary the present legal checks on corruption such as standardisation of campaigning expenses and prohibition of contracts between the Council and any Councillor in his private trading, industrial, or legal capacity.

The chairman of the Council (the Mayor) interprets standing orders, and decides whether any particular motion is in order or not, but his rulings are subject to review by the General-purposes Committee if formally dissented from by more than one Councillor.. The Chairman also has power to deal with any Councillor guilty of "irrelevance, tedious repetition, unbecoming language, or any breach of order," and the Council may suspend any Councillor for indiscretion in "any matter the disclosure or publication of which would be prejudicial to the interests of the Council."

The Councillors are elected by bare majority, 3 from each of the 15 wards of the Capetown municipal area (i.e., 45 in all), and they hold office for three years. Retirement is by rotation, one Councillor from each ward retiring in September, and being replaced by the newly-elected ward representative each year. Thus continuity of policy is assured by having a third of the Councillors replaced annually instead of the whole lot every three years. The fact that elections are held at fixed intervals (even though the interval is as little as one year) makes it difficult for the electorate to show its opinion on particular issues, as distinct from general policy. The "referendum" (see p. 28) has been tried in Capetown to remedy this fault but only proved to be a useful instrument in the hands of an obstructive minority, and like all similar measures can only be regarded as an attempted corrective showing public mistrust of the system of representation. Many valid arguments can be brought forward against the ward-system of bare majority election ; that scattered minorities have no chance of representation ; that it is not as accurate a gauge of public opinion as the system of proportional representation would be ;[3] that it results in inter-ward rivalry and jealousy, each representative insisting on such amenities as swimming baths and open spaces, while refusing to accommodate such liabilities as sewage-disposal works or non-European housing estates (the two are regarded with equal distaste), in his ward. Although the system of proportional representation through a single constituency is liable to abuse through party politics (the springing up of "bosses," and "invisible government" by vested interests), and does not give such personal contact between the electorate and its representatives as the ward-system does ; yet, in a city with an enlightened electorate, it has a stabilising effect, and is the sounder system of the two. Capetown, however, does not possess such an electorate, and few of her citizens are unselfish enough or long-sighted enough to countenance for a moment so "undemocratic" a system. As an example of the flexibility of electoral methods in Capetown, it is worth noting here that owing to war conditions retirement and election of Councillors has been suspended in the years 1940 and 1941, a measure that will probably be followed after the war (or sooner, if it becomes necessary) by a simultaneous re-election of the whole Council, and possibly a re-delimitation of the wards.

SUBDIVISION OF COUNCIL INTO COMMITTEES.

As it would be impracticable for the full Council of 45 members to spare the time, or gain the necessary special knowledge, to attend to all the details of the wide range of municipal activities, the work is divided among several committees. The work may be split up into separate functions (public health, transport, etc.) each assigned to a standing committee of Councillors, or into separate aspects (finance, legal, etc.) similarly assigned, there being in either case also a General-purposes Committee, largely composed of chairmen of the various other committees, to deal with general points and to ensure proper co-ordination. These alternative systems may be termed the "Vertical" and the "Horizontal" Committee principles[4] respectively thus :—



A small number of Committees, and those of small size, despite the comparative ease of corruption, makes for greater efficiency in co-ordination and in "getting things done" generally. Wide powers may be delegated to the various committees, but minority interests should be protected by the stipulation that each Councillor is entitled to election on at least one of the standing committees. Precautions must be taken to ensure adequate continuity in the membership of committees to permit smooth running and the acquisition of specialist experience by the Councillors, especially in connection with municipal trading enterprises, which would otherwise suffer from disorganisation disastrous to a business undertaking. The device of co-option is useful for the temporary

inclusion of experts on any committee, and for linking the work of a committee with that of unofficial organisations engaged in the same field. To ensure their subordination to the Council as a whole, each committee must keep full minutes of its meetings (which may be attended by any Councillor not on the committee) and submit a report of proposed action for approval of the full Council.

EXECUTIVE OFFICIALS; QUALIFICATIONS, APPOINTMENT.

The head official of each Executive Department is appointed by the Councillors. It is his duty to advise the Committee which is in charge of his department on alternative courses of action, and to put their decisions into effect. His post is one requiring imagination, knowledge of his subject, disinterested honesty, and all-round competence. He should accordingly be chosen with care, treated with respect, and given wide powers and an adequate salary. In appointing such heads of departments, the Committee should beware of false economy and local favouritism—the co-option of one or two disinterested external experts to the Committee should assure the choice of the best man for the job. The recommendations of the head official for the appointment of subordinate officials should be followed by the Committee, which must supply the full Council with adequate reasons for any departure from such recommendations; thus the head official and the Committee are both checked in any granting of "jobs to pals."

As officials take no part in Council business or debate, they should not be exposed to public criticism which they are unable to rebut, and even criticism of their personal qualities in open Council could be avoided by the introduction of a standing committee to deal with all staff questions. Any public grievances in this connection should be directed to the Council which makes the appointments, not to those appointed. While on the one hand the Council should obviously have the power to dismiss an incompetent official, on the other hand the latter must be safeguarded from victimization. Hence appointment, and confirmation after the probationary period, must be carried out with particular care by the Committees, and officials dismissed thereafter only with the consent of the full Council. A possible alternative would be to set up a consultative board of Councillors and officials in equal numbers, to decide all problems of harmonious relations between the Council and the various executive staffs.

Great improvement in the standard of Executive Officials might result from some scheme of part-time training of municipal officials organised by the University, Technical College, or independently by the Provincial Department of Education, such as a course of lectures and a Diploma in Public Administration. From the point of view of the officials themselves, apart from better chances of promotion, such a diploma could carry a salary-bonus as an incentive to voluntary study.

CO-ORDINATION OF DEPARTMENTS: MUNICIPAL RESEARCH.

"I have given you powers of choice, and you only alternate.
Between futile speculation and unconsidered action."
—T. S. Eliot.

The eternal problem of reconciling freedom and efficiency crops up once more as soon as one tries to investigate the foremost defect of Capetown's municipal organisation—lack of co-ordination between its various executive departments. Inter-departmental rivalry and hostility; inconsistencies in policy; jobs that get done twice by mistake; jobs that it's nobody's business to attend to; each department getting in another's way; waste of time, labour, money. If the Council-manager System is considered (quite unjustifiably) as too undemocratic for Capetown, the only remedy would seem to be to set up some new body (say, a departmental committee of the executive heads of the departments with extra officials temporarily co-opted as required, the most suitable chairman being the Town Clerk, who is usually, by the nature of his work, the best-informed official on current municipal activity) to advise its opposite number on the Council side (the General-purposes Committee) of inconsistencies in policy and of overlapping or gaps in the administrative machinery.

Of great assistance to such a departmental committee, and also to the General-purposes Committee, would be a research section of the Town Clerk's Department exclusively engaged in continuous study of contemporary municipal problems to ensure that the lessons of experience (both local, and of other cities) and the conclusions of commissions of inquiry are of some live use, and do not lie forgotten and dusty in the files of the records clerk.

CENTRAL CONTROL OF LOCAL GOVERNMENT.

"And fynaly, what wright that it withseyde
It was for nought; it moste been, and snolde:
For substance of the Parlement it wolde."
—Chaucer: Troilus and Criseyde, 1383.

However desirable freedom of local government may be the central (Provincial and Parliamentary) governments must be able to exercise a certain amount of control over the cities if the country as a whole is to have a coherent policy and legislation. The difference should be clearly understood between local self-government (municipal services and enterprises, matters of local policy, etc.), and local administration of central governmental functions (legislation, police, education, etc.). Neither should it be forgotten that the whole local self-governing system is itself a creation of the central government, the powers of the City Council having been derived from central proclamations and ordinances. Apart from keeping within the framework of these definitely legislated powers, the local government is not directly responsible to the central government, any dispute as to the legality of an act of the City Council or an infringement of its rights being decided in

the ordinary law-courts, in whose decisions the central government has no say whatever. There are, however, a few definitely municipal activities for which the Council must first obtain the approval of the central authorities (this approval being almost invariably given) namely ; the passing of by-laws, floating of loans, selling of municipal land, closing of streets, erection of municipal buildings on public land, and any major public works projects affecting areas outside the municipality's jurisdiction. The central government also keeps a check on municipal administration of Native Affairs by requiring each Council to establish a special Native Affairs Committee and Executive, and to submit a separate Native Revenue account, which would in practice only be questioned if found to show a surplus, indicating that the general revenue was benefitting from profits in native administration. Finally, the City Treasurer must submit annual financial statements to the central government, all auditing (except that of the municipal loan account) being done by local officials.

While civic independence should be valued and preserved, the central government should definitely be kept in better touch with opinion in the municipalities than is the case at present. This could be achieved by, say, a Municipal Association composed of a mayor from each city and representatives of the central government, meeting at infrequent (so as not to take up too much of the members' time in travelling) but regular periods, for purposes of discussion and debate. Such a body might render unnecessary the Commissions of Inquiry called in the past by the provincial administrators, which have been remedial rather than preventative, and which by their nature tend to create bad feeling. Bringing the cities under provincial audit would help to maintain contact, and incidentally simplify the drawing up of national and comparative provincial financial statistics. There are many other ways in which better contact could be maintained between the central and local governing authorities, namely, a department of town-planning and inspection of local governments under the Provincial Administrator, the publication of provincial year-books, establishment of a townships board, and the interchange of municipal and provincial officials.

The disadvantages of lack of control by the central government are exemplified in the excessively rugged individualism of certain cities in America, where many States were forced to exercise administrative control for the first time when some of their municipalities simply defaulted in payment of interest on their loans during the financial crisis of 1929. In normal times, however, the State governments tend to shirk their duty, and confine themselves to passing masses of idealistic legislation without the machinery for the enforcement thereof ; or to the use of "probes" (to expose and remedy municipal malpractices) similar to the South African commissions of inquiry, but usually making the most lurid disclosures, while having a negligible practical effect. The opposite extreme, with perfect co-ordination between central and local governments, may be seen in the still more unfortunate example of post-1933 Germany.

CITY REVENUE : (a) RATES AND TAXES.

> They marched down three abreast, each clad in his cleanest garments, saluted the Magistrate, and clapped their hands delightedly. All were very jovial, and obviously got a thrill out of taxpaying, to which they had been looking forward for weeks."—Report of the Resident Magistrate of Papua, 1938.

One of the oddest phenomena of our cities is that known as the "Ratepayer's Psychology." Even a child should be able to see that the fundamental nature of the municipality is a pooling of the tokens of our resources (i.e., Money) for the provision of actual essential services (drainage, street-lighting, etc.) at as small a cost to each of us as individuals as is possible. Thus taxes save us money, and the wider the powers of taxation which any local government has the easier it is for it to develop expensive services such as hospitals and education without calling on the central government for help, and the more its citizens will benefit. The tendency to morosely regard as onerous all local government services, and to avoid at all costs any increase in the rates, is a symptom of the Capetown public's ignorance of the duties of citizenship, and is a stumbling block in the way of a progressive local city government.

Fixed Property Tax, at the time of its origin in an agricultural England (1601), was a rough and ready general income tax ; but with industry and company development resulting in non-material forms of wealth such as share-holdings and salaries, it has come to be a tax on but one of the many present forms of wealth. Nobody would maintain that each individual ratepayer receives a benefit from local municipal services in proportion to the value of his fixed property—the aim of the property tax is to provide such services for rich and poor of the city alike at the expense of the former ; wealth in its non-material forms is dealt with by the central government by means of the income tax and company tax. The Fixed Property Tax in Capetown may not exceed a limit laid down by the Provincial Council. The present rate is 5d. per £1 of assessed value, the amount approximately required to make up the deficit when revenue from all municipal services and trading enterprises has been totalled up. The fact that this is a flat rate levied on the combined value of land and buildings, assessed on capital (not rental) value, and payable by the owner (not the occupier), unfortunately tends to discourage owners from developing or improving their sites, and thus leads to housing shortage, unduly high rentals, and overcrowding ; and the speculator in vacant land, while retaining his original low rate of assessment, may find his property enhanced in value by municipal expenditure on public services, which have been disproportionately paid for by adjacent owners of improved properties. These disadvantages could be remedied by a differential-rating policy such as has been successfully tried in Durban, where site-values are taxed at a high rate and improvements at a lower rate, thus penalizing

the owner who keeps his land undeveloped as a speculation, and incidentally ensuring that (as is not the case with the flat-rate system) the total rateable valuation will rise in sympathy with the increase in municipal expenditure caused by any wave of improvements by private owners.

Many American cities, besides the Property Tax, have an additional system of special assessments for special undertakings (e.g., provision of a vibration-resisting rubber-block surface to a busy street, paid for by local building-owners in proportion to their frontages thereon) provided that at least a third of the property-owners affected thereby approve of the undertaking. The system is an interesting minor development of local taxation, but does not seem to be in accord with the principle of pooling resources for the good of the city as a whole, and is most undesirable if extended to essential services such as water-supply and sewerage.

Many Continental cities, especially those of Holland and Scandinavia, rely on a local income-tax (distinct from and in addition to the national income-tax) for as much as 70 per cent. of their total revenue. While taxation on ability to pay is indubitably the most equitable principle known, such a local income-tax has many disadvantages in a country where income-tax already plays an important part in the national budget; there is a danger of excessive disparities between the various municipal areas necessitating re-distribution by the central government, and thereby the loss of financial independence; the system is also opposed to the sound principle that the sources of local and of national revenue should be kept separate, disregard of which (in the matter of licensing for example) has almost invariably led to abuse, difficulty of collection, and generally unsatisfactory results in the past.

CITY REVENUE: (b) MUNICIPAL TRADING.

> "No sorwe, ne no drede of deeth, ne no-thing that may falle un-to a man is so muchel agayns nature, as a man to encressen his owene profit to the harm of another man."—Chaucer: 1388 (Tale of Melibeus).

We have seen that the financial independence of Capetown's municipality has made necessary the undertaking of various profit-making trading enterprises to swell the city's revenue, such as water-supply, gas, electricity, swimming baths, abattoirs and markets, etc. Municipal trading has certain disadvantages—apart from the tendency to corruption inherent in all systems involving the granting of monopolies, the profits of municipal trading enterprises must be controlled[5] if the ratepayer is not to be unduly favoured at the expense of the consumer of public utilities, and such control is liable to be either too lax to prevent profiteering, or so severe as to hamper the department concerned in establishing an adequate or satisfactory service. Nevertheless as a general rule, extension of municipal trading may be said to be highly desirable; for the provision of public utilities by private enterprise has the same faults to a much greater degree, and as many utilities (especially that of transport, which in Capetown is still a private undertaking) are intimately bound up with such problems as town-planning and housing of the poorer working classes, their being in private hands may lead to unwarranted obstruction of schemes essential to the social welfare of the community.

Similar municipal monopolies for the provision of public utilities have been granted to self-governing cities by act of parliament in most democratic countries, and have been found to provide satisfactory service and to avoid unnecessary duplication, competition, and profiteering. They have always met with strong opposition from private enterprise, especially in America where in fact the majority of public utilities are provided under "franchises" purchased from the municipalities. Municipal trading was very widely practised in pre-1914 Germany, and even included such enterprises as breweries, quarries, restaurants, and dance-halls. Trading was in two distinct categories—non-profit-making services (e.g., Sanitation, refuse-removal, abattoirs, etc.; often run at a loss through granting lower charges to poor areas), and revenue-producing enterprises (e.g., Electricity, transport, luxuries, etc.). Such private capitalists as were allowed to provide utilities had to pay considerable royalties to the municipal funds over and above the ordinary taxation on industrial concerns. The cities of the U.S.S.R. have in recent years naturally developed the most extensive municipal (or more accurately, State) trading in the world; for instance Moscow's Mossoviet and District Soviets control, as well as all public utilities, innumerable heavy and light productive industries usually considered the incontestable preserve of private enterprise.

CITY REVENUE: (c) MUNICIPAL LOANS.

> "All men are ready to invest their money.
> But most expect dividends."—T. S. Eliot.

In periods of expansion it usually becomes necessary for the municipality of a city to float a loan (in the city itself or in another city) to meet increased capital expenditure. The Capetown Municipality must first obtain the approval of a public meeting of local electors before applying for permission to raise a loan, to the central government, whose duty it is to see that no city's indebtedness becomes so large as to impair the national credit, or to weigh too heavily on future generations of ratepayers. As well as granting permission to float loans, the central government appropriates certain sums from the national revenue as special "loan-funds" (e.g., Housing Loan-fund, Electricity supply commission Loan-fund, etc.), and distributes loans at very low interest to such municipalities as apply therefor, for purposes of developing and encouraging any special services.

If, in floating loans, all the usual precautions are taken (such as the creation of sinking-funds for redemption within a definite period, and making allowance for depreciation of assets created out of loan moneys) the nett loan-debt may be

kept within control, and municipal stock may offer unimpeachable security to investors, which in turn means that loans can be floated more easily, and at lower rates of interest.

Nevertheless, it is sound policy to meet as much of the capital expenditure as possible out of ordinary revenue. In other words; out of current revenue, rather than paying interest on, and providing a sinking-fund to redeem, money borrowed for capital expenditure in the present or past, the ideal of a long-sighted municipal financial policy could be to set aside and put out at interest a "rising-fund" as a reserve for capital expenditure in the present or future.

THE PLACE OF THE NON-EUROPEAN IN THE CITY.

> "No sign marks the grave of Dimbu. He has no master to make him work; there are no angry words, no pain, no hunger, no fears. He sits there in his own place and no man can take it from him. His own place is a hole in the grass. That is all."—Williams and May: The story of Shabala.

Whether consciously formulated or not, the principles of the extreme segregationists are as follows:—The Natives are animals, once dangerous, but now useful as a source of labour if they can be kept under rigid control. They should be confined to reserves in the country and locations in the city, such locations being chosen with as much care as the site for a sewage-disposal works. Cities are the creation of the white man, and any Natives in excess of the number he requires for unskilled labour are redundant, and must be removed from the city area within 48 hours. Those required for labour should be treated as temporary sojourners without rights of residence or citizenship, segregated in locations run at as little cost to the municipality as possible, and under no circumstances allowed to become a nuisance to the white citizens.

A smaller number of extreme protagonists of the non-European cause demand absolutely equal rights of citizenship and proportional representation for non-Europeans, here and now. Putting down the mighty from their seats and exalting those of low degree is an act of Godlike wisdom—giving the non-Europeans a complete franchise at present would be an act of typically human folly. Such extremists are blind to the dangers of a democratic franchise in the hands of an (admittedly through no fault of their own) ignorant electorate, and to the fact that it would bring disaster to the non-European as well as to the European.

The sanest policy for the European at present would seem to be one of a trusteeship encouraging the non-European to develop along his own or Western lines as he chooses, until such time as he may be entrusted with a degree of self-government. At all events, municipal action must be taken to protect the non-European from the necessity of supplementing his earnings by illegal means, and to abolish the slums where he lives in squalor and pays exorbitant rents. The City Council, by the provision of decent living conditions, must enable him to live a fully human life; and while the non-European wage[1] remains at its present low level, must provide all the necessary municipal services at a financial loss. Overpopulation of the existing rural Native reserves compels a flow of Natives to the cities, but the urban Native can never become a useful citizen while there is nothing in the city to take the place of the tribal training of the kraal. Improvement of the reserves by extension of their area and the provision of educational facilities (especially of agricultural education) would check the excessive flow of Natives to the cities, and ensure that any Natives drawn to the cities in future would have at least sufficient rudiments of education to be fit to live in them.

In itself, the principle of segregation has many advantages, particularly to the non-Europeans themselves, as it makes possible the growth of a genuine community life impossible to slum-dwellers in scattered parts of a city. If the Municipality were wise enough to provide the non-European community with planned housing, schools, recreation-grounds, medical services, etc., the initial financial outlay would soon be neutralised by rising non-European revenues, until the community would eventually become financially self-supporting, and worthy to shoulder the responsibility of self-administration. Expediency, if not conscience, demands that the ruling minority should gain the confidence, and not the hatred, of the non-Europeans in South Africa.

BOREDOM OF THE ELECTORATE.

> Only when the citizens understand the running of their city can they take a pride in it.

Seldom does more than half Capetown's electorate take the trouble to vote. Hence all that can be said is that the Council governs the City without the articulate disapproval of a majority of its inhabitants (those who do not trouble to vote), and with the expressed approval of about one tenth (those who have voted for a successful candidate). In a sense it may be claimed that if Capetown were seriously misgoverned a much more active interest would be taken in her government; but this is a purely negative defence, a quibble, and the actual fact that an apathetic electorate is a drag on progress, is indisputable.

There are three reasons for which a man stays away from the polls:—He is well satisfied with the government of his city; he is so dissatisfied that he despairs of the effectiveness of his vote; or with typical South African indifference, he knows nothing of city-government, and it has not occurred to him to vote. The last-mentioned point, at least, can be remedied; yet Capetown's university, schools, and newspapers make no attempt to educate or interest the present or future electorate in the principles of city-government. Coherent literature dealing with South African municipal

affairs (as the writer has found to his cost) is practically non-existent. Party politics increase interest in Capetown's government it is true, but contending propaganda can never replace the need for impartial education.

The normal curriculum of schools in America (where polling percentages are twice as high as in most South African cities) includes such instruction ; and the American public is kept in touch with the city hall and its cultural activities ; while each municipal department has a "public-relations officer" to assist the citizens to understand and make intelligent use of the service it provides. Is it too idealistic to demand that Capetown's educational institutes should allow no student to graduate into the life of citizenship without at least having had the chance of acquiring the rudiments of civic knowledge? Whether by such methods as those suggested above or not, Capetown's electorate must be brought to civic consciousness before the citizens of a future generation will be able to aspire to the dizzy heights of civic pride so pleasantly apparent in the very air of the cities of such countries as Holland, Sweden, Norway and Finland.

NOTES ON CHAPTER 3 :

[1] e.g., Newark, N.J.'s five Commissioners in charge of Public Safety, Revenue and Finance, Affairs, Works and Parks, and Property.

[2] Capetown's council definitely suffers from lack of leadership, a condition which could be quite feasibly remedied by the introduction of a post equivalent to that of the City-Manager.

[3] A system of proportional representation was tried in Johannesburg in 1903—each voter voted for 30 candidates, the ten receiving most votes being appointed for three years, the next ten for two, last ten for one year.

[4] For the committee organisation of Capetown, see Chart, "Organisation of Capetown Council," on page 29.

[5] "The trading department (electricity) should not be regarded as a taxing machine, but its profits should be used in improving service, reducing the tariff, and stimulating the use of electricity for industrial and general purposes."—The Spencer Commission.

[6] Regarding wage-regulation, the Native Affairs Commission (1939-40) recommends official recognition of native Trades-unions, and co-option or permanent membership of their representatives on all municipal Native Affairs Committees.

APPENDIX

SOCIO-ECONOMIC CLASSIFICATION OF OCCUPATIONS OF EUROPEAN MALE VOTERS IN CAPETOWN :—*

Professional and Administrative, (e.g., accountant, company-director, doctor, stockbroker)	8%
Subordinate Professional, Independent Commercial (e.g., agent, farmer, importer, musician, teacher, traveller)	20%
Subordinate Commercial, (e.g., clerk, salesman, shop-assistant, typist)	19%
Skilled Manual, (e.g., book-binder, cabinet-maker, compositor, metal-turner)	17%
Predominantly Manual, but with responsibility, (e.g., foreman, policeman, engine-driver, guard, tram-conductor)	5%
Semi-Skilled Manual, (e.g., apprentice, domestic servant, factory hand)	16%
Unskilled Manual, (e.g., bill-poster, delivery-boy, dock or other labourer, cleaner)	5%
Not Actively Income-Earning, (e.g., landowner, pensioner, retired, student)	10%
Seeking Employment, (e.g., unemployed)	1%

BIRTH, DEATH, AND INFANT MORTALITY RATES PER 1,000 POPULATION (1935):—

	Capetown	London	England and Wales
Births	18.09	13.6	14.7
Deaths	10.68	12.3	9.0
Infant Mortality	45.14	66.0	57.0

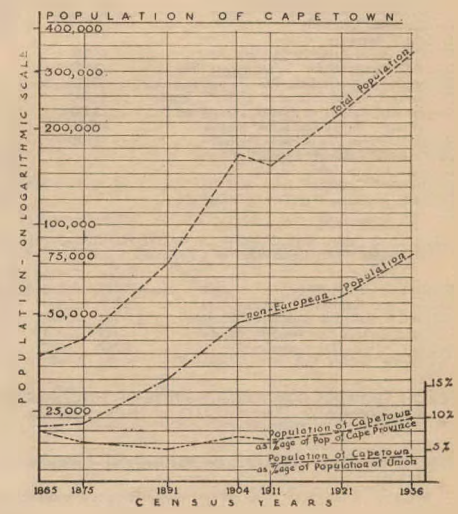
RATEABLE VALUE, RATES:—(1940):

Sites	£20, 459, 894	i.e., Total rateable valuation
Improvements	£37, 859, 418	£58,319,312
Rates	5d. in the £1	

FINANCIAL STATISTICS OF CAPETOWN MUNICIPALITY:—(1936):

Assets.		Liabilities.	
Total rateable valuation	£55,313,006	Expenditure	£2,663,551
Trading concerns and other assets	£19,287,784	Loan debt	£14,935,303
Estimated Revenue	£2,804,231		

*Figures based on M.C.T. Social Survey of Capetown, 1941.



GENERAL REVENUE, EXPENDITURE, REQUIREMENTS FROM RATES, OF VARIOUS DEPARTMENTS, YEAR 1938.

	Rev. £	Exp. £	Req. fr. Rates. £
Surplus/Deficit brought forward	1,553	—	—
Improvements and Parks	29,978	117,637	87,659
Streets and Drainage	255,052	864,448	609,396
Street Lighting	—	30,000	30,000
Health, Hospitals and Washhouses	73,026	197,638	124,611
Housing and Slum-Clearance	102,240	107,202	4,962
City Plans and Development	19,937	35,582	15,644
Markets	22,367	21,946	—
Slaughterhouses	39,248	32,849	—
Fire Brigade	8,795	54,339	45,543
Traffic Control	32,705	43,391	10,686
Native Affairs	22,928	38,459	15,531
Airport	5,037	10,013	4,977
Orchestra	7,094	20,666	13,572
Finance and General-purposes	135,492	270,537	135,048
Afforestation	2,085	4,537	2,452
Special Grants under Ordinances, etc	—	61,209	61,209
Electricity Works	1,013,913	963,913	—
Water Works (Surplus to own funds)	387,612	365,940	—
Rates	1,210,560	—	—
	3,369,622	3,200,306	1,161,290
Less contribution to Rates by Markets			422
by Slaughterhouses			6,399
by Electricity			50,000
Total requirements of Departments from Rates			£1,104,469

VARIOUS CONTRIBUTIONS AND SUBSIDIES, TO AND FROM CAPE-TOWN MUNICIPALITY. YEAR 1938.

	Rev.	Exp.
To Hospital Board		£35,064
To Capetown General Board of Aid		13,814
To Capetown Medical School		2,000
To Capetown University		4,000
To School Board		1,172
S.A.R. & H., as Rates for Harbour Area	£4,940	
Union Government, for Opera House Site	3,000	
Commission on collection, D.C. Rates	5,937	
Government; for maintenance of Procl. Roads	30,000	
Government; Refund on Health Expenditure	18,532	
Government; State-aided Butter scheme	30,185	
Government; for Fire Brigade services	3,120	
To Peninsula Publicity Association		2,750
To South African Public Library		2,451
To Technical Colleges		3,400
To public functions, Mayor's hospitality, etc.		5,046

DISTRIBUTION AND EMPLOYMENT OF NATIVE POPULATION; (Census of Natives, 1938; Urban Area of Capetown).

	Males	Females	Total
Resident in Urban Area	11,445	4,340	15,785
Resident and Employed in Urban Area	9,878	2,444	12,322
Resident in U.A. but employed elsewhere	247	21	268
Employed in U.A. but resident outside	429	9	438
Resident in U.A. but unemployed	1,249	1,840	3,089
Temporarily visiting U.A.	71	35	106

HEALTH STATISTICS COMPARING WELFARE OF EUROPEANS AND NON-EUROPEANS; (Report of M.O. of Health, Capetown, Year 1938).

ANNUAL DEATH-RATE PER 1,000 OF POPULATION:—(Average, years 1927-37).

Cause.	European	non-European
Measles	.02	.16
Tuberculosis	.8	4.82
Syphilis	.07	.77
Bronchitis and Pneumonia	.81	4.78
All other diseases	8.87	13.60
Total	10.57	24.13

AGE AT DEATH:—

Age-Group	Percentages of all Deaths. European	non-European
Infants	7.25%	26.11%
1 to 5 years	3.02%	20.39%
5 to 25 years	6.41%	11.35%
25 to 65 years	41.69%	31.47%
Over 65 years	41.63%	10.68%
	100.00%	100.00%

NOTE 1:—
Only 16.7% of European deaths were of persons under 25 years ; the equivalent non-European figure being 57.9%

NOTE 2:—
Of the year's 22 Suicides, 15 were European; this being almost the only death-cause where the non-European figures are better than the European.

LEGITIMACY :—

	European	non-European
Illegitimate Births as %age of Total Births	5.8%	26.8%

TRADING ENTERPRISES, (a) ELECTRIC LIGHT AND POWER :—(1938) :

Area of supply 50 square miles; Distance to furtherst point 27 miles. Number of Consumers, 48,494; Units sold, 217,999,210.
Plant capacity,* 28,500 k.w.; Maximum load, 25,000 k.w.
Charges :—
Domestic lighting and heating, 1/6 per room, plus ½d. per unit consumed (min. 5/- per month).
Domestic power, 1½d. to ¾d.; also bulk-supply rates.
Lighting on other premises, 3¾d. to 1¾d., sliding scale.
Industrial power, neon signs, etc., at bulk-supply rates.
Council encourages use of electric service by various schemes of financial assistance to prospective users, hire-purchase of electric appliances, installations at reduced rates, etc.

TRADING ENTERPRISES, (b) WATER SUPPLY :—(1938 figures) :

Capacity of reservoirs, 6,634,000,000 gals.; Max. daily supply, 22,000,000 gals.; Average daily consumption, 12,422,000 gals.; Average pressure, 150, Max. 250 ; Charge, 2/- per 1,000 gals. (Quarterly minimum for properties valued under £200 is 8/-, over £200 16/-).
Capital expended, £5,261,229 ; repaid or in sinking-fund, £2,169,059. Nett profit, £21,672.

TRADING ENTERPRISES, (c) GAS SUPPLY :—

Domestic charges, 4/- per month, plus 6/6 per 1,000 cub. ft. consumed. Industrial: Sliding scale for bulk-supply. Appliances and installation at below cost from Council.

SOUTH AFRICAN PUBLIC LIBRARY, CAPETOWN :—(1938) :

Established 1818 ; is controlled by Committee ; contains the following sections :—African, Children's, Technical, Book-binding, Music, Reference, Copyrights, Patents, Reading room.
Number of books, 280,000 ; Number issued during year, 122,000: Number of subscribers, 1,705 ; Expenditure, £8.248. Union Government grant, £3,000 ; Municipal grant, £2,420.

EDUCATION :—

All higher Education (universities, techs., etc.) is directly under the Superintendent-General of the Union Department of Education. The Cape Provincial Education Department supervises and subsidises all schools except the few private schools in Capetown. Primary schools are free, and a few secondary schools, though most are fee-paying but State-aided. Education is compulsory up to 16 years of age ; non-European education, however, is neither compulsory or free, but is undertaken by voluntary religious missions with State-aid in payment of teachers' salaries.

WEATHER STATISTICS, CAPETOWN:—

Lat. 33°56' South; Long. 18°29' East.
Prevailing summer wind, steady S.E. Trade ; winter, rainbearing N.W.
Mean annual temperature, 62°F. (max. 72° in Feb.; min. 54° in June).
Mean barometric pressure, 30.195" humidity, 74.98.
Average rainfall 22", on 110 days per annum ; hours sunshine, 3,000.

AVERAGE RETAIL PRICES OF COMMODITIES:—(1937).

Bread	3.7d. lb.	Rice	2d. lb.
Butter	1/5 lb.	Sugar	3.3d. lb.
Coffee	1/5 lb.	Tea	2/1 lb.
Eggs	1/8 doz.	Bacon	1/7½ lb.
Flour	3.2d. lb.	Mutton	8d. lb.
Milk	3d. pt.	Coal	2/4 100 lb.

* The new Power Station has 120,000 k.w. capacity.

PROTECTIVE IMPORT TARIFFS :—

Customs Tariff Act protects local industries (provided their products are up to standard in quantity, quality, and price ; and that they maintain satisfactory labour conditions) by imposition of duty on certain imported articles.

Total S. African imports, 1937, (chiefly raw materials, machinery, textiles, clothing) value £103,367,765.

Total S. African exports, 1937, (chiefly gold bullion, wool, diamonds, fruit, maize) value £122,497,693.

TAXATION IN CAPE PROVINCE :—(1938 rates). :

Two forms ; Indirect—Customs and Excise duties which affect the individual through prices of commodities.

Direct—various State, Provincial, and Municipal taxes :—

STATE :—

Taxation on incomes (earned or unearned) derived from sources within the Union.

Normal Tax is payable on incomes* over £400 (plus various abatements for dependants, insurance premiums, subscriptions to charities, etc.) at rate of (1/- plus $\frac{1}{500}$d. times taxable number of pounds) or (2/-), whichever is the less, per £1 of income, the tax being then reduced by 30%.

Supertax is payable on incomes over £2,500 (with diminishing abatements on income up to £5,000) at rate of (1/- plus $\frac{1}{500}$d. times supertaxable number of pounds) or (5/-), whichever is the less, per £1 of supertaxable income.

PROVINCIAL :—

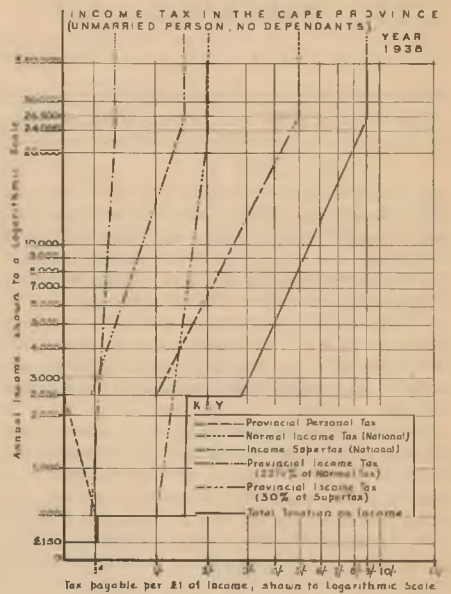
Personal Tax on unmarried persons at rate of (2/6 for each £10 of income over £150) or (£5), whichever is less.

On married persons (male) at rate (10/-, plus 2/6 for each £10 of income over £250) or (£3), whichever is less.

Provincial Income Tax, a %age of State taxation, as shown on this page.

MUNICIPAL :—(various rates, fully described on page 32).

* Not payable on dividends, these being taxed at source (Company Tax).



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THE FUTURE OF INDUSTRIAL DESIGN

By Herbert Read, M A., D Litt., Director of the Design Research Unit*

A Lecture delivered at the Royal Society, Piccadilly, on June, 10th, 1943, under the auspices of the Design and Industries Association.

Assuming there are only a thousand people in this country with a sufficient appreciation of the principles of good design, these thousand people, if given a free hand, would be able to transform in a relatively short time the whole process of mass production—would be able, that is to say, to transform the whole character of our physical environment.

If we ask why the designer is not given a free hand in the modern industrial system, we shall find three answers, all of them arising out of the economic structure which has arisen parallel to the industrial system, but which is not a necessary part of it.

If you will look at our economic system as distinct from our industrial system, you will discover three features which effectively prevent the free use of good design. If your economic system is such that an expanding amount of production from competing sources is pitched against a relatively static or even shrinking power of consumption, then what we without shame call "cheapness" will become the dominant factor in production. That cheapness should ever have become a virtuous quality in our civilization is, of course, a sufficiently damning criticism of that civilization. For cheapness implies a continual minimizing process—less of everything, less raw material, less labour, less time, and above all, less "overhead charges," a mystical formula which covers, among other things, the payment of a designer. The first answer to our question, therefore, is that the present economic system tends to eliminate design in the costing process : design doesn't necessarily pay.

If by means of social credit, or some such method, we could ensure that purchasing power was always geared to the volume of production, then the qualitative factor would begin to tell. In other words, if an economic system can not only deliver the goods but also distribute them to the point of full satisfaction, then the competitive instincts will be diverted into qualitative rather than quantitative channels. Let me put it another way : any such system involves the determination of just prices. Is it conceivable that a just price for any article can be fixed without taking into consideration its quality and design?

The second reason is closely related. Design is intangible —almost, to the manufacturer, metaphysical. Why, in the midst of a mechanical and materialistic world, should the hard-headed manufacturer be expected to pay for a metaphysical entity? Why, in the name of all that's prudent and profitable, should he attempt to change the existing shapes of things It is not his business to improve the world, but to pay a dividend.

In the third place, modern industry depends on its system of distribution—the gigantic organization of wholesale and retail trade. Hidden in this very intricate pile is a very black nigger : he is called the buyer. He is the funnel through which the mass production of the factories must pass. He earns his living on a commission basis. For many years now he has been making quite a nice living out of a regular sale of Jacobean oak furniture, oriental carpets made in Kidderminster, lampshades with silk fringes and cushions with appliqué butterflies. Then one day a mild fanatic from the DIA comes along and tells him that he is a corrupter of public taste and that he ought to give the public something "fit for its purpose," etc., something severe but subtle in glass or stainless steel. Now it may be that these new objects are infinitely better both from a functional and an aesthetic point of view : it may be that there is a large public ready to buy them. But however eloquent we may be, and however many facts about the adaptability of public taste Mass Observation may produce, there remains a very real element of risk for the buyer. And apart from the risk, there is all the trouble of learning a new sales talk, all the troubles of converting scores if not hundreds of retailers. This is a very real snag in the path of progress in industrial design, and I see no way round it short of an abolition of the commission basis upon which the buyer depends for his living. It is a pernicious and illogical system in any case, for a man's income should depend, not on other people's needs but on his own.

There are many signs that the economic system is changing and will continue to change : indeed, it must change in accordance with the process of economic stabilization which is everywhere taking place and to which we must adapt ourselves if we are to avoid an unending series of world wars and the ultimate extinction of our civilization. Stabilization when it comes will be expressed in a general tendency to substitute qualitative for quantitative standards. If there are any laws of history (which I doubt) this is one : that a stable civilization is biased towards quality of achievement, a bias which has hitherto eventually led to over-refinement and sophistication.

I have asked you to imagine that a stable civilization has been achieved, and that the industrial system is then devoted

It is of interest to note, that the ultimate purpose of the Design Research Unit is to create a training school of contemporary design modelled on the Bauhaus.—Editors.

to the mass production of articles which satisfy the aesthetic standards which we have established for machine art: economy, precision, fitness for purpose—all qualities of classical beauty. What then? We shall have factories full of clean automatic machines moulding and stamping, punching and polishing, innumerable objects which are compact in form, harmonious in shape, delectable in colour. Gone are the jointed and fragile objects which to-day we ingeniously construct from wood and metal: almost everything will be made from one basic plastic material, and beds and bathtubs, plates and dishes, radio cabinets and motor cars, will spill out of the factories in an unending stream of glossy jujubes. Nothing will be impossible. The technologist and the designer between them will be able to satisfy every whim and fancy. From a technical point of view, it will all be fearfully easy, and we may well ask ourselves what is to prevent this search for quality and variety degenerating into an avalanche of vulgarity? Nothing whatever can save us from that avalanche unless we take preventive measures now.

The most striking facts about the great epochs of art is their homogeneity. If we could transport ourselves into the sixth century in Greece, to the twelfth century in Northern France, the thirteenth century in Italy, the early eighteenth century in England, we should find not only great monuments of art in the cities and public places: diffused everywhere throughout those lands, in houses and clothes, in ordinary objects of utility and ornament, we should find the ubiquitous stamp of a civilization. It would not all be refined: it might be rough in texture, even crude in conception. But it will never be vulgar. The shape will be good, the ornament appropriate, the colour harmonious. Now, the usual assumption is that somehow or other the high cultural achievements of an elite at the top of such a society trickle downwards until they reach the lowest cottage in the land. But such a theory is not borne out of the facts. Apart from the absence of any means of diffusion, such as we possess nowadays in the press and the radio, in mass production and mechanical distribution the chronological evidence is all against it. The peasant art comes first—we can prove it in the evolution of an art such as Greek pottery. But more than this: I believe that the peasant art is there all the time until it is corrupted by influence coming from a more artificial class. Good taste is always built up from a broad basis: it is a slow elaboration and refinment of instinctive activities natural to man, and this slow process is what we call a tradition in art. I mean that the fingers must feel the clay, the crisp substance of the wood, the tension of the molten metal; there must be sensuous contact of hand and eye with the grain and grit. Otherwise we have made a divorce between man's senses and man's artifacts which has never existed before in history, and from which consequences will flow of a quite unpredictable nature.

The atrophy of sensibility which will be involved in such a cessation of handwork will involve the decay of our civilization—some of us would say that the evidence is already plain to see, that the decomposition has begun. It would be possible to elaborate an up-to-date psychological theory to explain why this should happen: it is summed up in one of the most ancient of psychological maxims: nihil est in intellectu quod non fuerit prius in sensu, which means that the basis of intelligence is a lively sensibility. If by advances in technology, in machine-tool design, by factory organization and so on, the human element is largely eliminated from production, then, apart from the problem of the adequate distribution and consumption of these mechanically produced goods—a problem which, as I have already said, could conceivably be solved by some scheme of social credit—there remains not only what the sociologists call the problem of leisure, but this much more serious aspect of the problem which I have called the atrophy of sensation. You might solve the problem of leisure, not only by employing a greater number of people in distributive trades and social services, but also by various forms of cultural entertainment. It is an only too credible possibility —a vast conglomeration of shop-walkers and civil servants, ticket-punchers and typists, their hands getting more and more refined, their minds more and more cultured. Even the peasant's fingers will have forgotten the knack of milking a cow and the spade and fork will have joined the rest of the neolithic tools in our museums.

It might be said that I have forgotten the designer, and the pattern maker and the machine-tool maker. But these people who may still be required to use their hands in creative contact with a material will always be an insignificant minority in any industrial community. No: if we are to go forward to the logical conclusion of the machine age, then we must create a movement in a parallel direction and not in opposition.

We must establish a double-decker civilization. Such a phenomenon has, indeed, appeared many times in the course of history, chiefly in primitive communities where a secret art was practised by the priesthood in complete independence of the utilitarian or decorative arts of the common people. But the most striking example of a duplex civilisation is that of Ancient Egypt, and it is one which offers some striking parallels to our own. In the valley of the Nile there existed for many centuries side by side two types of art of entirely distinct character. One, consisting mainly of public buildings and sculptured monuments, was religious: the other, consisting mainly of paintings, small carvings and decorated vessels of various kinds, was domestic. The religious art was geometric, rational, objective, abstract: the other was naturalistic, lyrical, even sentimental.

A similar stylistic division has already become evident in our own time. Surely between the constructive art of a Gabo or Nicholson, the functional architecture of Le Corbusier or Aalto on the one hand, and the rest of what passes for art and architecture on the other hand, there is not merely a separation, but a decree absolute. Among that rest there is much that is merely bad and imitative. But among it we shall find the naturalistic, the lyrical and sentimental modes of expres-

sion which correspond strictly in character to the domestic arts of Ancient Egypt. So therefore we are already a double-decker civilization, though there seems to be some confusion on the lower floor.

The art of the machine can never be naturalistic or humanistic : it is an art of geometrical proportions, of purely formal harmonies. Though my last wish is to exclude those intuitive faculties which only the artist can bring to bear on industrial design, its general character can best be described as objective rationality.

Do not let us make the mistake of assuming that a civilization can be based on rationality or functionalism alone. The foundations of a civilization rest not in the mind but in the senses, and unless we can use the senses, educate the senses, we shall never have the biological conditions for human survival, let alone human progress.

We must look forward, therefore, to some division of our human and social activities which will ensure a due proportion of time devoted to manual craftsmanship. It would be quite impracticable to achieve this by any artificial interference with industrial development. We should divide the industrial world into a technological priesthood and a lower order of handicraftsmen. That solution might be possible under some system of centralized planning, but I think we can dismiss it as undersirable and as only partial in its effects. But there is another possibility, and this is to make the division horizontal, affecting every industry and every individual, but only up to a certain point. In other words, let every individual serve an apprenticeship in handicrafts. Creative arts of every kind should be made the basis of our educational system. If between the ages of five and fifteen, we could give all our children a training of the senses through the constructive shaping of material—if we could accustom their hands and eyes, indeed all their instruments of sensation, to a creative communion with sounds and colours, textures and consistencies, a communion with nature in all its substantial variety, then we need not fear the fate of those children in a wholly mechanised world.

The result would be a private art standing over against the public art of the factories. I am recommending that everyone should be an artist. I am not recommending it in a spirit of dilettantism, but as the only preventive of a vast neurosis which will overcome a wholly mechanised and rationalized civilization. But I make a further claim. The art of that completely mechanised civilization can never, if it is to be an art, arise from the purely rational solution of functional problems. The function, after all, always relates to human needs. Human needs, in their turn, are always related to a natural environment. There can be no artificial separation of art from nature, of the machine from its environment. Only a people serving an apprenticeship to nature can be trusted with machines. Only such a people will so contrive and control those machines that their products are an enhancement of biological needs, and not a denial of them. Only such a people will be secure from the debilitating effects of mass production and mass leisure (miss-called "unemployment"). Only such a people, with sensations still vivid and intelligence ever active, can hope to form a stable and integrated society in the industrial world of the future.

With acknowledgments to "The Architects' Journal" for July 1, 1943.

WARTIME BUILDING 5

This supplement is the fifth of a series published by courtesy of the Building Control Investigation Section, with the object of keeping Members informed of the developments of constructural methods, new and substitute materials, and tests, which have come about as result of war conditions.

BUILDING CONTROL INVESTIGATION SECTION: THIRD REPORT

A Short Review of the Research Work of the Past Ten Months, carried out by the Civil Engineering Department, University of the Witwatersrand, Johannesburg, on ALTERNATIVE MATERIALS FOR TIMBER AND FOR STEEL.

At the beginning of 1943 the main materials items affecting the building industry were acute shortages of timber and of steel, of these the former being the more serious. It was therefore considered that the most profitable direction for research work lay in investigating materials and methods of construction which would relieve this situation.

In house construction much of the timber is used in the roof. As steel was in short supply the only other suitable materials for use as alternatives for roof timbers appeared to be concrete and similar compositions, reinforced if necessary.

The desired qualities of an alternative material to timber appear to be high flexual strength, durability, light weight, nailability and sawability; the last three of these qualities are not essential but are very desirable. Research work was therefore directed firstly to the investigation of lightweight concretes such as those having granulated slag, foamed slag and vermiculite as aggregates, for use as structural materials, capable of application to roof truss, rafter, purlin or batten construction. Parallel with this, work was undertaken on the reinforcing of concrete with bamboo, since this method of construction has given satisfactory results oversees, particularly in the Axis countries and Japan.

LIGHTWEIGHT CONCRETE.

In the case of new materials it is necessary to evaluate various structural properties such as compressive and tensile strengths and elastic modulus, before the design of structural members can be undertaken. During the determination of the compressive strengths of lightweight concrete it became evident that these materials could not be expected to yield products which would be stronger yet lighter than those obtainable with ordinary concrete; and further, for equal values of physical properties, ordinary concrete is generally considerably cheaper than lightweight concretes.

For this reason there is little possibility of obtaining satisfactory structural members composed entirely of lightweight concrete. Investigation is, therefore, now being directed towards the combination of lightweight concretes with other materials for structural uses.

BAMBOO REINFORCEMENT.

As mentioned above, bamboo has been used as concrete reinforcement in other countries. It has a high tensile strength and its form is such that it can be used without further shaping, while if desirable, it can be split easily into strips. Bamboo used as reinforcement in concrete would reduce steel requirements, which, at the commencement of this research work had to be kept to a minimum. Moreover, timber could be saved if bamboo reinforced beams could be used instead of all-timber beams, while the sawability of bamboo (or wood) is an additional advantage.

From initial experiments done with bamboo, it was apparent that some waterproofing coating would have to be used, since if this were not done the bamboo absorbed moisture and consequently swelled in the concrete, resulting in cracking of the concrete and consequent loss of bond. The latter property was very noticeable even if no cracking occurred, and is due to the high surface polish of the bamboo. With bamboo in strip form the bond was better than for whole canes, but was still too low to be satisfactory. The only water-proofing treatments which gave promise of success were white lead paint and patent knotting; neither of these, however, was available in the country in sufficient quantity for the purpose.

TIMBER REINFORCEMENT.

At this stage in the investigations, attention was directed to the use of timber laths as reinforcement for concrete since these would be in many respects more suitable than bamboo. Timber laths are much more readily obtainable than bamboo, since the latter is not a common commercial product; sizes can be specified much more simply, while hard and tough timbers which are unsuitable for joinery, and waste strips (even those with small knots and other defects) can be used. The surfaces, if left rough sawn, give better bond than bamboo. The swelling difficulty consequent on changes in moisture content of course remained; but this affects the bond of timber in concrete to a lesser extent than in the case of bamboo.

CUT ON DOTTED LINE.

Some experimental work on timber reinforcing of concrete was carried out in Russia in 1928, and this led to the building of timber reinforced abutments and piers for a Siberian bridge a few years later. Scots fir which had been immersed in water for at least two weeks, most of it for some months immediately prior to use, was employed as reinforcement.

In the case of the research work under consideration, tensile tests carried out on some pines, acacias and eucalyptus showed that none of these had strengths as high as strip bamboo, although Eucalyptus Maculata and Eucalyptus Saligna (heartwood) approached it in this respect. Except for Pinus Insignis and Acacia Mollissima the elastic moduli were about equal to or greater than that of bamboo.

A large number of water-proofing and other treatments were tried, in order to get over the swelling difficulty, including painting with or dipping in oils, paints, tars, bitumens, solutions of tannin and alum calcium chloride and sodium silicate. None of them, however, proved entirely satisfactory, for although some of them caused large increases in bond as compared with untreated timber, none of them prevented cracking of concrete in every case: in fact some of the so-called water-proofers, increased the degree of cracking, since their effect was not to prevent but merely to retard water absorption. The result was greater swelling in some timbers, at a time when the concrete had already hardened.

Notwithstanding the cracking mentioned, some very promising results were obtained from timber-reinforced beams which had small cracks along their whole lengths, indicating that bond was still satisfactory. The safe loads for these timber-reinforced beams approached those of normal steel reinforced beams, though for timber reinforcement the cross-sectional area of reinforcement required was about ten times that for steel.

Since the absorption of water by, and the consequent expansion of timber is not a physical process like the soaking of a sponge but rather a physio-chemical process, work was next directed to finding a treatment that would not necessarily decrease or prevent water absorption but would affect the timber colloids so as to reduce their expansion.

Of the large number of treatments tried, the most promising was soaking in aluminium sulphate solution. This solution must be allowed to soak into the timber for one to two weeks when it causes a considerable reduction in movement.

The necessity of substitutes for steel reinforcing is less urgent than was the case a year ago as more steel is now available for this purpose. If, however, a considerable increase in industrial and building activity occurs suddenly, steel supplies may again be in short supply. For this reason and for its application to Sorel cement products, research into timber reinforcing is being continued.

SOREL CEMENT.

Owing to the shortage of timber, reinforced concrete is being more widely used in place of it. Compared with timber, ordinary reinforced concrete members suffer from the great disadvantage that they must be cast to the exact dimensions required and cannot subsequently be cut to size or built up on the site. Research was therefore instituted to find a more satisfactory substitute for certain uses of timber. The most promising material so far found, is Sorel Cement, reinforced where necessary with timber laths. In this connection the term "Sorel Cement" is used somewhat loosely for a mixture of magnesia, sawdust and a solution of magnesium chloride. Sorel Cement has the following advantages over ordinary concrete :—

1. It weighs about half as much.
2. It can be sawn, nailed and screwed.
3. Since like timber it is hygroscopic, and shrinks and swells in a similar way, reinforcing with timber presents fewer difficulties.

Its disadvantages as compared to concrete are :—

1. It has a lower compressive strength.
2. It is more expensive
3. It can be corrosive to metals.
4. It is attacked by alkalies in the presence of moisture.

It was accordingly decided to investigate thoroughly the properties of Sorel cement both from the structural and from the soundness point of view.

STRUCTURAL PROPERTIES OF SOREL CEMENT.

The structural properties that had to be evaulated, before beams and other reinforced members could be designed on a rational basis, were tensile, compressive and bond strengths and elastic moduli.

Since very little work had been done on those lines, it was necessary in the first place to determine the limits of satisfactory composition. This was done by testing a large number of specimens made of different mixes and gauged with different concentrations of magnesium chloride. The experimental results were then plotted as a series of curves from which optimum compositions for various purposes can be determined. The preliminary work has been largely completed, and structural members will now be designed and tested, using the information so obtained.

SOUNDNESS OF SOREL CEMENT.

Sorel cement has been used both in South Africa and overseas with varying results. Many failures such as cracking and even complete disintegration have been reported ; the time intervals before failure vary, according to these reports, from a day to the full life expectancy of 20-30 years. The

real causes of many of these failures have not been investigated but as a result of them a prejudice, perhaps justifiable, against the use of Sorel cement products is evident among architects, engineers and builders. On the other hand, Sorel cement products have in many cases given entirely satisfactory results.

Magnesium oxychloride is not inherently unstable ; it will not disintegrate autogenously, as is proved by the fact that some products made from it have given satisfaction for 30 years and more.

There have been several causes of failure of Sorel cement products in South Africa. An important one is probably the incomplete calcination of the South African magnesias which has led to rapid failure in accelerated tests carried out by Building Control Investigation Section, whereas products made of the same magnesias recalcined showed no such failures. B.S.S. No. 776 for magnesium oxychloride products limits the loss on ignition of magnesias to be used in Sorel cement products to 8 per cent. The figures for South African magnesias are generally in excess of this, usually from 12 to 20 per cent.

Another cause of failure has been insufficient curing. Two typical cases may be mentioned:—

A. Several window frames complete with sashes made of Sorel cement were used in a native house. Most of these were in a satisfactory condition at the time of inspection. One sash, however, had within six weeks of fitting warped to a radius of about 10 feet.

B. Some sets of wardrobes were built up of panels and shelves of Sorel cement composition. Several of these had bent or sagged within a short time of erection. Some of the panels were apparently built up of two thin sheets jointed face to face with neat magnesium oxychloride while still uncured. On subsequent drying the unequal contraction (uniform contraction over such large areas was hardly to be expected) caused severe buckling and consequent cracking. This failure could, no doubt, have been avoided if the materials had been cured properly before use. In any case the fixing together of two thin sheets of this material is unsound practice unless the bonded sheets are kept in shape during curing.

Another important cause of failure is frequent washing or wetting of Sorel cement products especially with alkaline solutions such as soapy water or washing soda. The effect is apparently much more serious on materials made from insufficiently calcined magnesias. Sorel cement products are, therefore, not suitable for kitchen or bathroom floors or fittings unless protected by an oil paint or oil or wax film, in which case the products should have a reasonably long life.

On the other hand there are some interesting cases of considerable resistance to rain, sun and all the vagaries of our weather, of properly cured specimens, not protected by coatings. For instance a Sorel cement window frame and sash which was half painted to give two different surfaces under comparable weather conditions was glazed and then set at an angle of about 45 facing north on the roof of the Hillman Laboratories, University of the Witwatersrand. It has been in this position for five months. The only obvious effect found so far is a slight superficial crazing of the weatherside face of the sash which is probably due to moisture gain on this particular surface during casting. No warping, bending or cracking has been observable although cycles of alternate wetting and drying occurred, particularly during the Spring rains.

As with all materials, therefore, there are several factors that have to be taken into account to obtain satisfactory results. To mention a few relevant factors :—

(a) The raw materials must be of satisfactory quality (B.S. Specification No. 776 deals with this matter). The proportions used should be within certain limits.

(b) Good workmanship is required.

(c) Conditions of use must be suitable.

It is, therefore, considered that with the necessary care in manufacture and use, Sorel cement products will be satisfactory.

CORROSION OF IRON AND STEEL BY SOREL CEMENT.

It has long been known that under certain conditions Sorel cement corrodes iron, steel and several other metals. If these metals are placed in a fresh Sorel cement mix, the corrosion is generally severe. If, however, Sorel cement products are well cured before metal is brought into contact with them, the corrosion of the metal is very much reduced. If the Sorel cement is and remains dry (this does not obtain in practice), no corrosion at all, occurs.

Much of the reported corrosion trouble has been due to contact of metals with a fresh mix. In South Africa most of the Sorel cement products are more or less cured before metals come in contact with them ; hence corrosion is not likely to be very serious in this country.

Research was undertaken to find a coating which will eliminate the risk of corrosion entirely. As a result of this work, it can be stated that galvanised or zinc spraying of iron or steel will prevent corrosion caused by contact with Sorel cement.

SAWDUST CEMENT CONCRETE.

Several proprietary sawdust cement articles such as floor tiles, window frames and sashes have appeared on the market. The sawdust used in these is subjected to certain chemical or bacteriological treatments, the details of which are secret. Such treatment is necessary to make the sawdust "inert" to

portland cement, that is, to remove or immobilise the water soluble organic materials in it which decrease the strength and time of set of the cement and also decrease the moisture movement of the particles of sawdust. Flooring materials so produced are still relatively expensive.

Research work was undertaken to find a satisfactory treatment of sawdust which would yield a relatively cheap flooring material when combined with Portland cement. A further promising use for such a material would be in wall construction.

One treatment in particular has given good results. Tests are now in progress in order to determine whether the material so treated is a stable material.

Although as mentioned above, several substitute flooring materials have appeared on the market, there is as yet no suitable cheap "warm" flooring material for low cost housing. This remark applies also to the pre-war days. It has often been the practice to lay concrete floors or merely to leave the natural soil as floor, although brick tiles, ash concrete, various asphaltic products and other materials have been tried.

A sawdust concrete mixture laid in situ with construction or dummy joints may be the answer to this problem. Good results can be expected only if the moisture movement of the material is low.

Research work has been undertaken by Building Control Investigation Section to determine whether a sawdust concrete can be produced which has the desired qualities. A Durban firm is at present laying proprietary sawdust concrete floors in situ.

WALLING.

Although brick walling is an established form of construction, it is considered possible that monolithic or prefabricated walls could be built more quickly and cheaply than brick walls. Ordinary concrete is not a suitable material for the walls of houses because its heat conductivity is too high. From this point of view, lightweight concretes are more suitable. They are, however, as previously mentioned generally more expensive than ordinary concrete. A possible exception to this rule is sawdust concrete, especially so if it is modified by the addition of soil.

If a combination of soil, sawdust and cement proves structurally satisfactory and if it has a sufficiently low heat conductivity, it has great possibilities for walling. There is an additional point in its favour when considering the increasing transport difficulties besetting South Africa; an appreciable amount of cartage is avoided if the soil on the building site can form part of the walls of buildings. It is, of course, not likely that all soils will be suitable, although this possibility is not excluded, but the established rules governing soil-cement stabilisation will also apply to walling.

Some work has been done in the U.S.A. on stabilised soil walling; the structural properties of soil-cement block and monolithic walls were found to be very good, but heat conductivity was high for these materials. It is for this reason that the soil-cement-sawdust combination is being investigated here.

It is probable that materials like vermiculite and sawdust concretes can only be exploited fully for housing if current building by-laws are relaxed in respect of minimum allowable wall thicknesses.

These materials are not being examined with a view to displacing brick entirely, but rather to the supplementing of the walling materials already available. It must be borne in mind that if a sudden large demand for bricks arose, as could easily happen immediately after the war is over, or even before that time, the brick yards would probably not be able to cope with it.

TESTS: FEBRUARY, 1943, TO NOVEMBER, 1943.

A number of tests was carried out during the year on various materials and structural members.

STRUCTURAL MEMBERS.

Some sectional roof trusses designed by the architectural division of Building Control Investigation Section were made at P.W.D. yard, Johannesburg. Tests on these trusses done under the supervision of the laboratory staff of Building Control Investigation Section, led to the conclusion that such designs were suitable as alternatives to timber trusses in roof construction.

Other members tested were the following:—

1. Light reinforced concrete beams of I Section.
2. Hollow spun reinforced concrete beams.
3. Asbestos cement purlins of channel section.
4. Battens of sisal-reinforced Sorel cement.

The last two types listed gave promising results, showing that they could be used in roof construction.

MATERIALS TESTS.

The main item under this heading is that of floor testing. Details of this work have been published in the "S.A. Builder" for July, 1943, and the "S.A. Architectural Record" for September, 1943. Other testing work carried out was as follows:—

1. Suitability of enamel-painted asbestos cement for sanitary purposes.

2. Suitability of South African glazed earthenware for sanitary ware.
3. Suitability of asbestos cement sinks for domestic use.
4. Quality of Ceiling and Wall board made by a new process.
5. Tests on the quality of some sawdust cement samples for use in building construction.

Reports on all these tests have been submitted to the Deputy Building Controller.

ENQUIRIES.

A large number of verbal and written enquiries on technical subjects were received by Building Control Investigation Section, indicating a considerable amount of interest in the research work being done at the University. Although some of these enquiries could not be answered directly because of lack of experience in the problems involved and lack of opportunity to carry out investigational work, it is felt that valuable help has been given to many enquirers.

WORK IN PROSPECT.

Up to the present, work on the strength of materials has been very much, perhaps too much, in the foreground in building construction in all countries, while design for health and comfort is often neglected particularly in low cost housing. One reason for this discrepancy is probably the fact that it is relatively simple to test and specify strengths of materials, whereas comfort cannot readily be assessed prior to construction, and can only be estimated subjectively afterwards.

It is well known that to obtain comfortable temperatures in living quarters, floors, walls and roofs of dwellings must be thermal insulators.

The thermal conductivity of flat structural units can conveniently be measured by a guard ring type of conductivity apparatus. For these reasons, it is intended to design and build such an apparatus at the Witwatersrand University. The insulating values of various materials and combinations of materials, and the effect of changes in thickness, which are of such immediate importance to the building industry, can then be accurately determined.

CONCLUSION.

In recent years, considerable advances have been made in industry, agriculture, transport and means of recreation. There exists, however, a considerable lag in the application of progressive methods to building generally. Building research alone will not, of course, overcome this discrepancy ; there are too many other factors involved. But it can and does help to apply technical advances involving new methods of construction and new materials by investigating their merits prior to use, thus avoiding costly mistakes and failures.

31st December, 1943.

CUT ON DOTTED LINE.

The following is a Selected List of Recent Additions to the Johannesburg Public Library.

Clark, D. A. R. Materials and Structures—R.602.1.

Cotton, C. A. Climatic Accidents in Landscape-making—R.551.3.

Davey, H. T. Wood Finishing, Staining and Polishing and Cellulose Wood Finishes—R.6983.

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