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1950
South African Architectural Institute
http://hdl.handle.net/10539/22924
South African Architectural Record; Journal of the Cape, Natal, Orange Free State and Transvaal Provincial Institutes of South African Architects and the Chapter of South African Quantity Surveyors. 1950 35:1-12 p1-275

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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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VOLUME 35

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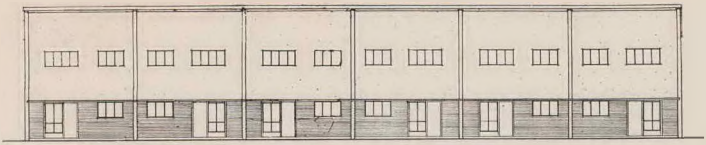
DUPLEX FLATS AT CRAIGHALL, JOHANNESBURG

COWIN & ELLIS, ARCHITECTS

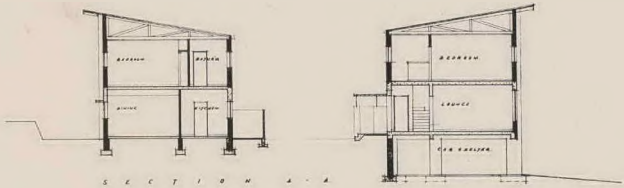
The Minerva Estates Company which promoted this project desired to put into effect a scheme comprising a series of flats of a duplex type, in which four units were grouped about a central staircase. Each flat was entered from each successive quarter-space landing. Apart from the question of orientation which arose the project could not be made to comply with local by-laws. It was ultimately decided to build a series of conventional duplex units about a central court with the main aspect of the flats away from the court.

In spite of the fact that the site is extensive in area the present Town Planning provisions limit "business use" to the first 100 ft. from the street boundary—which is now one of the main arteries linking Johannesburg and Pretoria. Thus, in order to avoid protracted negotiations and delays the building was, of necessity, sited on this delimited area, with the resulting disadvantage that it is closer than desirable to the main road.

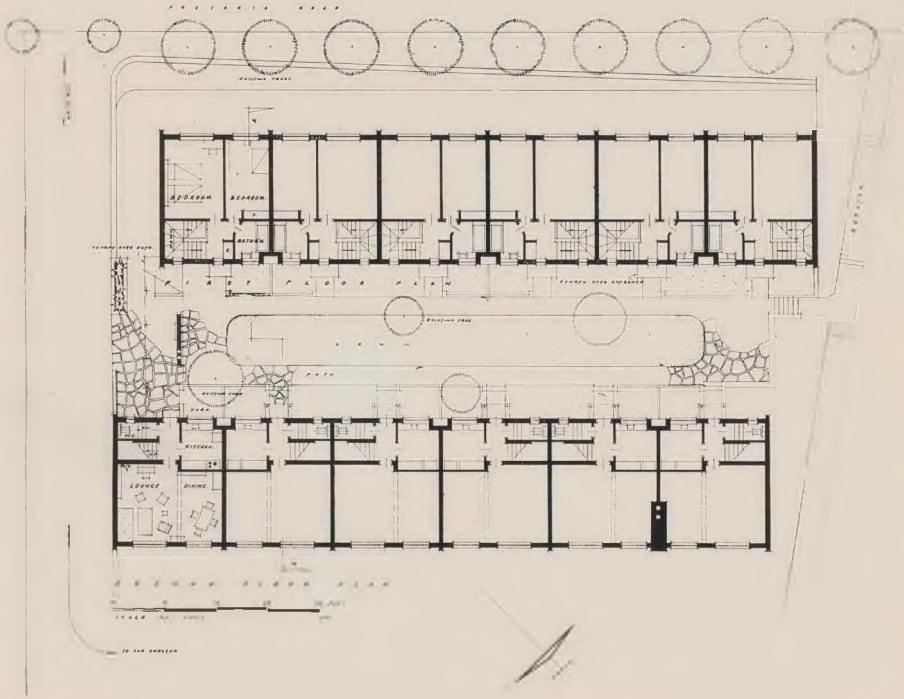
The finishes chosen, while simple and economical give the building a bright and colourful appearance.

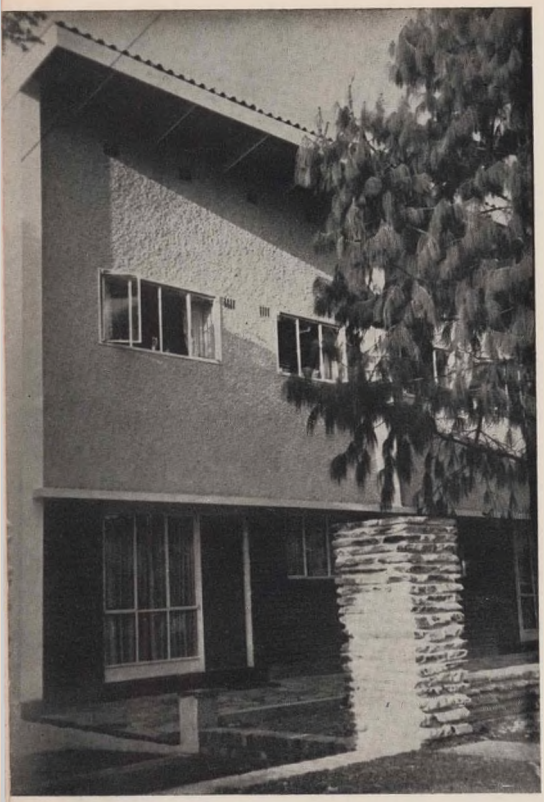


SOUTH-WEST ELEVATION



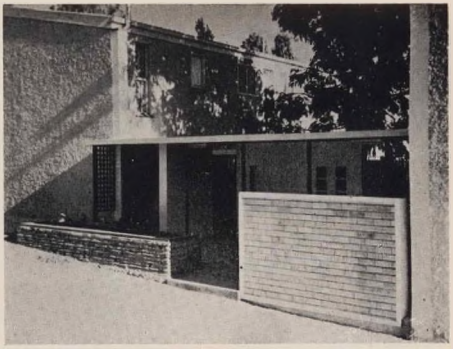
SECTION A-A





LEFT: Detail of South-West corner. Windows are painted lemon yellow, lower wall in iron-spot facebrick, upper surface in white rough cast. Soffit of eaves painted azure blue, rafters white. End walls natural colour rough cast. Piers painted ivory. Roof corrugated asbestos. BELOW, LEFT: General view from the road. BELOW, RIGHT: Detail of the entrance to the court and to the flats on the South-East elevation.





MODERN SHELL ROOF STRUCTURES IN SOUTH AFRICA

By Dr. Oswald Graats

During the past few months the daily newspapers have been publishing many articles on local building methods which would lead one to believe that building construction and the types of buildings erected in South Africa are antiquated. These articles praised modern buildings in Europe and held them up as examples of what should be done in this country. This, however, does not accurately reflect the true state of affairs in the building industry of the Union.

It is not true that the development one sees in building science and practice overseas has stopped at the borders of South Africa or that the builders of this country cannot hold their own against those of foreign lands. In South Africa there are numerous examples of modern structures which, in all respects, may be favourably compared with similar undertakings overseas. The relatively meagre volume of technical literature reporting new developments unfortunately retards the rapid dissemination of knowledge of improvements in building technique, which probably explains the general ignorance in this respect.

* * * *

These circumstances provide the reason for this article by means of which it is hoped to provide professional men with a better acquaintance of reinforced concrete shell structures, one of the modern developments in building construction which has been introduced here in recent years.

By shells we mean curved slabs whose thickness is very small relative to their spans and which, by virtue of their curvature, achieve great stiffness. This stiffness makes possible the covering of large areas without intermediate supports. The principle of the shell is best illustrated by the common household egg. Because of the curvature of its shell, the egg exhibits extraordinary strength when considered as a whole, but a piece of the shell small enough to be considered almost flat, when removed from the rest of the shell, fails under very small bending stresses.

Because of the curvature a three dimensional beam action arises which it is not possible to calculate by the ordinary principles of elementary statics. The equations of the elastic theory are used as a basis for the theory of shell calculations. A system of three simultaneous partial differential equations is obtained from which, however, by small simplifying assumptions a single partial differential equation of the eighth order results. This can be further simplified by expanding the stress function as a Fourier series and changing the partial differential equation into a total differential equation whose solution is the sum of two damped vibrations.

To avoid separation of the shell from its edge members, shell and edge members must act together as an elastic system with four redundancies. When the dimensional relationships are such that a change in stresses at one edge of the shell causes appreciable changes of stress at the other edge, the system becomes one with eight redundant quantities. For the ordinary relationships of stiffnesses of shell to edge members, occuring in practice, the number of redundancies can usually be reduced to three or six.

To calculate these redundancies the edge members are considered as separated from the shell by a cut in which the forces required for the equilibrium of the shell without bending are considered as acting. The statically indeterminate values required to close the aperture of this cut are a system of horizontal forces, vertical forces and shear forces acting in the plane of the cut, as well as a bending moment to correct the rotation at the edge.

The difficulty of the calculation is probably the reason for the fact that this new form of structure has not received the wide application it deserves. In recent years, however, several approximate formulae have been developed which makes it possible for less practised mathematicians to calculate the simpler forms of shells and shells of moderate spans.

* * * *

Many forms of shell construction exist which may be divided into two main groups; according to their curvature, the shape of the area to be covered and the magnitude of spans desired.

(1) CUPOLAS or DOMES, which may be subdivided into
  - (a) Surface or revolution shells for covering circular areas,
  - (b) Domes for covering elliptical areas,
  - (c) Domes composed of stiffened cylindrical shells (curved in one direction only) for covering polygonal areas,
  - (d) Spherical shell sections (curved in two directions) for covering polygonal and rectangular areas.

(2) VAULTS, which may be subdivided into
  - (e) Cylindrical vaults (curved in one direction only) for covering rectangular areas,
  - (f) Vaults curved in two directions for covering rectangular areas where large spans are desired.

The shape of the curvature may be circular, elliptical, parabolic or any other desired shape as long as it can be mathematically treated.



Fig. 1. Interior.

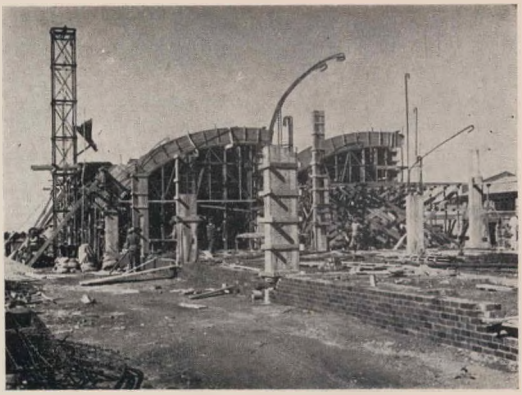


Fig. 2. Shuttering.

Factory building at Springs for Messrs. Seco (Pty.) Ltd. The building is 60ft. by 240ft. with column centres at 28ft. 7ins. and 30ft. 4½ins.

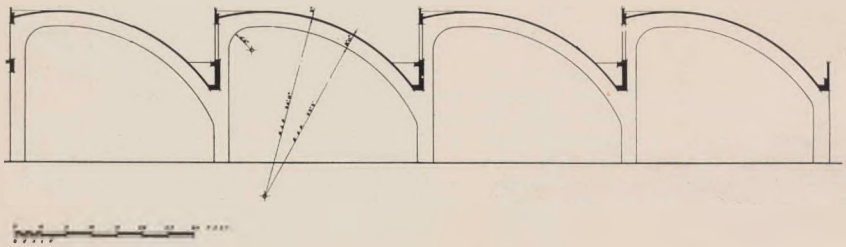


Fig. 3. Cross-section through roof for a factory covering an area of 540ft. by 160ft. Column centres are at 40ft. and 60ft.

The weight of the shell is transmitted chiefly by compressive forces to the members stiffening their edges. The bending moments in the shell occur chiefly at the edges or at points of change and can be dangerous. In shells of large span the danger of buckling must be taken into consideration, but the shell may be safeguarded by the introduction of buckling ribs. A safety factor of 3 against buckling may be taken as sufficient.

Shell roofs covering an area of 350 ft. x 350 ft. (122,500 sq. ft. plan area) without internal supports may be designed, an achievement which is quite impossible for structures in reinforced concrete designed according to the methods in use up to the present. The field of application of shells includes :

(a) roofs for large areas where no intermediate supports are allowed;

(b) cooling towers of great height;

(c) bridges of large span;

(d) dams of great height.

The following are examples of buildings with shell roofs which are in the course of construction. Unfortunately it is at present only possible for me to cite examples of roofs designed by my office. I hope at a later stage to have the opportunity of giving examples of shells designed by other engineers.





Figs. 4 & 5.

Factory building at Wadeville for Messrs. E. S. & A. Robinson. It is a shed building of saw-tooth profile with inclined south-light windows, having an area of 204ft. by 196ft. Column centres are 25ft. and 30ft.

Fig. 1 shows a factory building, recently completed for Messrs. Seco (Pty.) Ltd. at Springs (Architect Mr. D. E. Barry, contractor Messrs. McLaren & Taylor (Pty.) Ltd.) The building is 60 ft. by 240 ft. in plan and provision has been made for future extension. The column centre lines are 28 ft. 7 in. by 30 ft. 4½ in. with expansion joints at 60 ft. intervals.

Fig. 2 shows the shuttering for the above factory.

At present another factory roof with column centre lines at 40 ft. by 60 ft. and of similar form, is under construction, with over all dimensions of 540 ft. by 160 ft. The thickness of the shell in this case will be 3 in. and the shell and edge beams constitute a system with six redundancies. The frames are continuous and because of their large spans have been calculated as a system which is 7 times statically indeterminate.

Fig. 3 shows the design for the roof. Fig. 4 and Fig. 5 show the factory building at Wadeville which has just been completed for Messrs. E. S. & A. Robinson (Architect Max Kirchhofer, Designer the late Mr. F. Porner, builders Messrs. Hemer & Forsyth (Pty.) Ltd.). It is a shed building of saw tooth profile with inclined south-light windows. The plan area is 204 ft. by 196 ft. with a basement of equal area. Column centre lines are 25 ft. by 30 ft. and the shell is 3 in. thick. Joints have been made at 60 ft. intervals to allow for expansion due to changes in temperature. The window area is 27% of the floor area and the light may be designated as good.

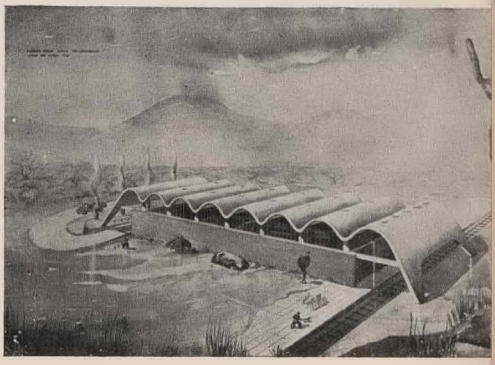
Fig. 6 shows another form of shell structure, ordinary barrel vaults with lateral windows. This building for Messrs. Potgietersrust Ko-operatiewe Tabakplantersvereniging has a modern elevation and it is interesting to note that there are no tie beams at the arch springing. (Architects Messrs. Verhoef, Smit & Viljoen, builder Messrs. Potgieters Builders (Pty.) Ltd.). The middle vaults are symmetrical, which makes it possible to simplify the calculation for self weight to a system with only three redundancies. The end vaults, however, produce torsion moments on the edge beams besides bending them inwards and thus have to be calculated as a system eight times statically indeterminate.

The stiffening arches are stressed by shear forces from the shell in the direction of the tangent to the curve. These stresses result in bending moments and large tensile forces in the arches. The tensile forces are largely compensated by the inclined position of the end columns. This measure results in a saving of steel. The clear span of the shell is 76 ft.

Fig. 7 shows a barrel vault shell roof over a coal bunker built for South Rand Collieries in Grootvlei. (Contractors Messrs. Roberts Construction Co.). It is interesting to note that the stiffening arches in this case are above the shell.

Fig. 6.

Fertiliser Store for the Potgietersrust Ko-operatiewe Tabakplantersvereniging, a building of barrel vaults and lateral windows.



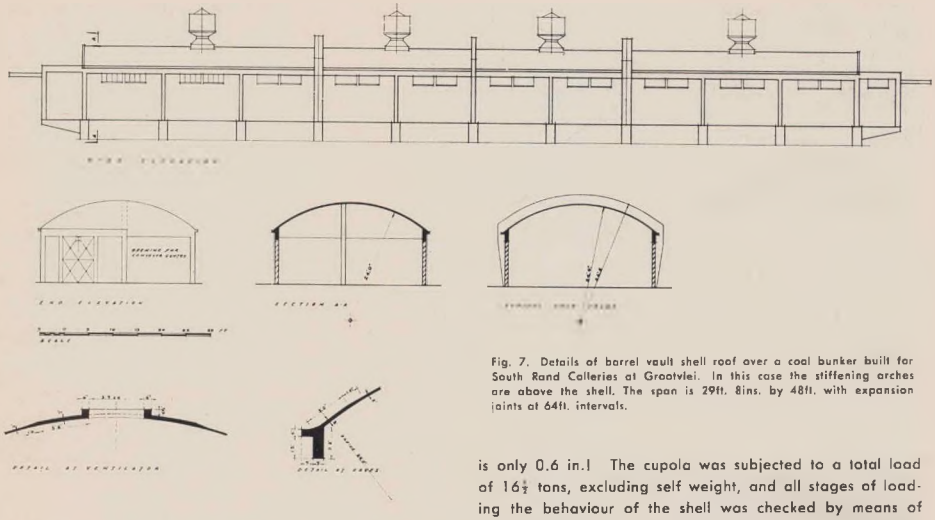


Fig. 7. Details of barrel vault shell roof over a coal bunker built for South Rand Collieries at Grootvlei. In this case the stiffening arches are above the shell. The span is 29ft. 8ins. by 48ft. with expansion joints at 64ft. intervals.



Fig. 8. Model of "surface of revolution" shell over 21ft. 6ins. bay, with shell thickness of 0.6in., being subjected to a test load of 16¼ tons.

The clear span is 29 ft. 8 in. by 48 ft. and expansion joints occur at 64 ft. intervals.

Finally I should like to mention that the latest form of shell for very large spans (up to 300 ft. by 300 ft. without intermediate supports) is the "surface of revolution" shell on four supports over a square plan area. These shells, because of their double curvature, are very stiff and resistant to buckling, and the bending moments are smaller than in the barrel vaults of the same span.

Fig. 8 shows a model of this type of cupola, being 21 ft. 6 in. by 21 ft. 6 in. in area and the thickness of the shell is only 0.6 in.! The cupola was subjected to a total load of 16¼ tons, excluding self weight, and all stages of loading the behaviour of the shell was checked by means of sensitive instruments. The loading was applied to the model in such a manner as to bring about worse conditions of stress than could ever occur in practice with large buildings. The behaviour of the shell under these loads left very little to be desired.

The most important application of shells in this country is probably when used as a roof, with the following advantages :

(a) large spans,
(b) no corrosion,
(c) no maintainance costs,
(d) good illumination,
(e) good ventilation,
(f) dustproof,
(g) fire resistant,
(h) well insulated against heat and cold,
(i) attractive appearance,
(k) no condensation of moisture on the inside of the roof,
(l) relatively inexpensive.

Recent investigation and data from U.S.A., a country where structural steel is relatively cheap, show that shell roofs for large buildings are not more expensive than steel structures (see *Architectural Forum*, Dec., 1949).

This modern type of structure is to be seen more and more frequently in South Africa to-day, and it is reasonable to presume that as the advantages of this type of construction become generally known, a large proportion of the factories still to be erected will rely on the shell for roofs.

SILICON ESTERS AND THEIR APPLICATION TO THE BUILDING INDUSTRY

By Clifford Shaw, B.Sc.

A new field of Industrial Chemistry opened up by the pioneer research of Kipping, King and others in England, and later extensively developed also in America, began to be of real importance only in the war years. Before the war, however, compounds derived from the combination of Alcohols with Silica were the first commercial members of what is now already a large family of Organo-Silicon compounds in which more or less of the carbon in an organic compound is replaced by Silicon.

For our present purpose it is of particular interest that these Silicon Esters found their first application in the treatment of stonework already decaying, and also of new stone as a protective and preventative measure, and accordingly they have in this connection a long and successful history.

In 1930 and 1931 King was already able to point to examples of successful treatment dating back some years, and during the years 1935/1939 the writer was associated with the restoration and treatment of numbers of buildings and monuments of irreplaceable value in England and on the Continent.

It is not proposed here to enter into detailed discussion of the chemistry of these compounds and their reactions, but briefly it can be said that a Silicon Ester breaks down into Silica and Alcohol forming a colloidal solution of Silica. The preparations are therefore not to be confused with Inorganic Silicates such as Sodium Silicate, which contain or give rise to salts and electrolytes, but rather constitute a convenient source of pure vitreous Silica entirely free from harmful by-products. It will be realised that the resulting Silica is insoluble in water, neutral and without chemical action on surrounding materials, acid-proof and resistant to high temperatures. The value of such a solution will be realised if the causes of Stone Decay are considered.

CAUSES OF STONE DECAY.

It is perhaps not surprising that the effect of industrial atmosphere on important buildings appears as yet to have aroused little concern in the Union, since both important buildings and such atmosphere are of comparatively recent advent. In England, however, the onset of the coal-burning era found in existence many buildings which had hitherto withstood almost unharmed the passages of centuries of normal weather, but which now commenced to crumble with alarming acceleration. The subject received specialised attention from such authorities as Laurie and Warmes, and in the early thirties the difficulties and dangers associated with stone restoration and preservation were already realised, so that the advent of the Silicon Esters was hailed by them as a step forward of real importance.

LIMESTONES.

The calcareous stones, being mainly Calcium Carbonate, are of course acid soluble. Sulphur acids discharged by power stations and other industrial installations are dissolved out of the atmosphere by rain water and react with calcium carbonate to form calcium sulphate. The solution penetrates the stone and when drying conditions return, dries to leave a crystal of Calcium Sulphate; the crystal grows until it occupies the interspace, and ultimately fissures the stone or blisters it.

The introduction of the insoluble silica coating not only reduces porosity, and therefore the movement of the destructive solution, but also envelopes each particle with acid-resistant coating.

REPARATION.

Where decay has done its work unchecked, it becomes in time necessary to replace or repair the damaged stones which may be not only unsightly but, especially in the case of cornices, mouldings or other projections, actually dangerous.

It has frequently happened that, to save the heavy cost of replacement, Portland Cement mixed with sand and perhaps coloured to match the surrounding stone, has been used to patch up the damage. No more fatal course could be adopted, since from the foregoing it will be appreciated that such a patch affords a rich source of soluble salts and calcium sulphate—all other normal cements are open to the same objection. Ethyl Silicate, however, provides a colourless strong cement when mixed with the appropriate aggregate, which is completely safe. The actual stone itself can be crushed and reconstituted, thus matching exactly the surrounding stone.

The writer was privileged to co-operate with Colonel Bertram Shore, Diocesan Architect in the southern counties of England, in the restoration in this manner of much priceless tracery in such ancient churches as Rye and Shoreham, and a highly successful technique was developed.

DECAY OF SANDSTONE

The attack upon soluble stones may be felt to be obvious, but it may well be asked: "Why should a sandstone, especially one without a calcite or soluble binder, also decay?"

Sandstones are of two types, i.e., silica particles bound together with a secondary silica cement, and silica particles bound with calcite or other secondary minerals.

Stones of the first category are the most resistant since obviously those having a soluble cement will readily weather.

The Free State sandstones are of the non-soluble type, and more detailed consideration of their structure and decay is necessary. Although containing no soluble constituent, the secondary silica binding the particles may be relatively feeble, giving a somewhat soft and highly porous stone which readily admits moisture and a high degree of capillary action. Such a stone does not contribute itself to its own destruction, but the acid water, meeting calcium in the mortar joints—whether lime or cement—will carry calcium sulphate into the pores giving the same effects as in the case of limestones. In the case of porous and jointed stones, decay may be even more rapid because of higher porosity.

The best sandstone, free when quarried from calcite, if set in lime or cement mortar, will be found later to be loaded with calcium sulphate. Prof. Laurie (J.S.C.I. 1925, p. 88) found that stone from Lincoln Cathedral contained 4.32% calcium sulphate in a boring ¾ in. from surface, and 2.44% up to 1 in. from surface. The quarry stone contained only 0.17%.

Other salts may also be agents of decay : in one case of the writer's, very severe disintegration had resulted from galvanised bars giving rise to Zinc sulphate, and many cases have been observed of the bursting effect of iron oxides and salts.

Soil salts are readily drawn up from the ground by capillarity, and will usually give the first notice of attack, generally about 2 ft. 6 in. above ground level. Such decay, as well as erosion along bedding planes, may be observed on several buildings in Johannesburg and Pretoria.

In Johannesburg, it is probable that erosion from windborne mine dump sands will be an additional and potent enemy to stones of the softer type, especially those with marked bedding planes.

In the past, often most unfortunately, proprietary preservatives consisting of waxes or shellac in solvents have been used. Such solutions seek to set up an impervious barrier to the water, and since they prevent the breathing of the stone they are harmful.

Silicate of Soda is another material which has on occasion been used for treating stone by those who have that little dangerous knowledge. Silicate of Soda gives rise to soda salts which experience has shown may cause extensive damage.

In effect, it was not until the introduction of organic silicates that the architect had at his disposal a solution which would penetrate deeply into a stone and there leave for all time a deposit of pure silica only, to harden, reduce porosity and resist acidity.

TREATMENT OF CONCRETE.

Concrete may be regarded as a synthetic calcareous stone consisting of calcium and aluminium silicates and some free lime.

As a flooring material it is attacked by lactic acid in dairies, vegetables and fatty acids, etc., in food factories, and salts in sub-soils.

It can logically, therefore, be improved in the same manner as the building stones. Additionally its abrasion resistance and therefore life under traffic may be greatly increased, as well as its tendency to "dust" materially diminished. In many factories this "dust" question is of importance, and here again the use of inorganic silicates is dangerous in so far as the electrolytes they contain may emerge as a very harmful alkaline efflorescence.

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Silicon Esters as Binders. S. King. (*Oil & Colour Trade Journal*).

TRANSVAAL PROVINCIAL INSTITUTE OF ARCHITECTS

ANNUAL REPORT 1949-1950

Your Committee has pleasure in submitting this the Twenty-third Annual Report, together with the Annual Balance Sheets and Accounts for the year ending 31st December, 1949.

MEMBERSHIP.

The membership at the close of the year consisted of 282 Practising members; 144 Salaried members; 38 Retired members; 4 Absentee Practising and 10 Absentee salaried members, a total membership of 478.

During the year under review 29 new members were registered, 6 members died, 1 member was transferred to another Provincial Institute. The total membership showed an increase of 28 as compared with last year.

The members enrolled during 1949 were:—

D. Myles, K. Knutzen, D. S. Petrovitch, K. Kock, J. D. Lovell, C. A. Stoloff, J. A. Schofield, R. Blain, W. H. A. Place, J. Morgernstern, Miss R. Levinsohn, Miss R. Borkowf. M. B. Hartley, H. J. Kok, B. Austin, L. A. Reeves, R. A. J. Guy, J. Peters, J. W. Biggar, B. W. B. Ball, R. R. Koller, G. F. de Q. de Gruchy, D. A. Crofton, F. Fisher, Miss M. B. Roux, E. Graaf, G. B. Bruton, D. E. Connell, I. Benjamin.

OBITUARY.

It is with deepest regret that your Committee has to record the deaths of six members of the Institute.

Donald E. Pilcher. The late Mr. D. E. Pilcher was educated at Marlborough College and the Architectural Association's School in London, and qualified for membership of the R.I.B.A. He practised in London, after extensive travelling, and became Assistant Editor of the "Architectural Review." During the war he served in London with the Royal Engineers and as Assistant Garrison Engineer in Assam.

He was a scholar with keen literary interests and after his discharge from the Army, he joined the Department of Architecture, University of the Witwatersrand, and became an Assistant Editor of the "Record." His book "The Regency Style" is an important reference work of wide interest.

W. D. Gibbs. The late Mr. W. D. Gibbs joined the Institute in 1927 and practised for many years in Johannesburg, but owing to being disabled, he was unable to resume his practice on his return from Active Service.

Robert William Scott. The late Mr. Scott became a member of the Institute at its inception in 1927 and was for many years on the staff of the Public Works Department, being appointed to the post of Assistant District Engineer, Johannesburg, from 1917 to 1930.

He subsequently resided at the Cape, but returned to Johannesburg in 1946, and from that year was registered as a Retired Member.

Siegfried Gotzsche. The late Mr. Siegfried Gotzsche was trained in Denmark and was in private practice in Johannesburg for some time before being appointed Architect in the mechanical engineer's department of Messrs. H. Eckstein & Co., where he did a considerable amount of work for the mines.

He joined the Association of Transvaal Architects in January, 1910, and was subsequently employed by the Central Mining and Investment Corporation until he went into private practice again in 1930. The Institute had occasion to congratulate him in 1929 on the honour bestowed upon him by His Majesty, the King of Denmark.

Kenneth Ronald Mackenzie. The late Mr. Kenneth Ronald Mackenzie was a Bachelor of Architecture, University of Liverpool, and joined the Transvaal Provincial Institute in 1927, obtaining his Associateship of the R.I.B.A. in 1929.

He was in private practice in Johannesburg from 1928 until he enlisted in 1940. On his return, he joined the National Housing and Planning Commission in a salaried capacity and later joined the staff of the Chief Civil Engineer for the South African Railways.

John Fraser Mackenzie. The late Mr. John Fraser Mackenzie was in private practice in Boksburg for many years and joined the Association of Transvaal Architects in 1909, being elected a member of the Committee in 1921.

He took up an appointment with the Kenya and Uganda Railways and after some years returned to South Africa, when he was employed by the Public Works Department in the capacity of Chief Clerk of Works. He returned to private practice in Grahamstown in 1945.

COMMITTEES AND MEETINGS.

Following the election at the Annual General Meeting in February, 1949, Mr. C. C. Irvine-Smith was elected President, Mr. H. G. Porter Senior Vice-President and Mr. R. C. Abbott Junior Vice-President for the ensuing year. During the year 11 Ordinary and 2 Special Meetings of the Committee have been held, and the following is the record of attendances, with the exception of the February, 1950, Meeting:—

Mr. C. C. Irvine-Smith (President)	12
Mr. H. G. Porter (Senior Vice-President)	7
Mr. R. C. Abbott (Junior Vice-President)	11
Mr. W. D. Howie	10

Mr. C. E. Todd	12
Prof. J. Fassler	4
Mr. D. S. Haddon	8
Mr. N. L. Hanson	6
Mr. B. S. Cooke	12
Mr. W. G. McIntosh	10
Mr. J. N. Cowin	12
Mr. W. A. Macdonald	8
Mr. M. D. Ringrose	11

LEAVE OF ABSENCE.

The following members were granted leave of absence for various periods during the year: Prof. J. Fassler, Messrs. H. G. Porter, W. G. McIntosh, W. D. Howie, B. S. Cooke, N. L. Hanson, M. D. Ringrose and C. C. Irvine-Smith.

SUB-COMMITTEES.

The following standing and sub-Committees were constituted: S.A. Academy, Finance, Public Relations, Practice, Joint Practice, Salaried Members', Johannesburg Building By-Laws and Pretoria By-Laws. During the year the Provincial Committee and 49 additional members served on these Committees. Some members serving on more than one Committee.

REPRESENTATION OF THE INSTITUTE.

Messrs. C. C. Irvine-Smith (alt. J. N. Cowin), N. L. Hanson (alt. B. S. Cooke), W. D. Howie (alt. Prof. J. Fassler), C. E. Todd (alt. R. C. Abbott), D. S. Haddon (alt. H. G. Porter), were elected to serve on Central Council for the ensuing year. Mr. L. C. Austin, a Pretoria member of the Chapter of Quantity Surveyors, was Chairman of the Executive Committee of Central Council.

The Institute appointed Local Advisory Committees in Johannesburg and Pretoria to assist the Regional Representative of the National Housing and Planning Commission.

The Institute has representation on the Committee of the A.S. & T.S., the National War Memorial Health Foundation, the S.A. Standards Institution, and, until the withdrawal of Building Control, on the Local Building Advisory Committees of Building Control.

The Institute has also been represented on the Board of Education on the Central Council.

THE SOUTH AFRICAN ACADEMY—1949.

The 30th Annual Exhibition of the South African Academy was held in the Municipal Art Galley, Joubert Park, from Friday, the 7th October, to Sunday, the 23rd October, 1949, and was opened by Mr. Charles te Water.

The total number of entries submitted this year was slightly less than last year's record: 800 paintings, 50 pieces of Sculpture and 50 Architectural exhibits. Of the 50 Architectural exhibits, the Jury found it possible to accept only twenty-two perspectives and one model and stated in its report that "the impression cannot be avoided, that the exhibition is below the usual standard, and is lacking in vitality." With regard to the model, the Jury reported "A well constructed model, the first to be exhibited will, it is hoped, be the precursor of other projects presented in a similar manner." It is to be regretted that Architects throughout the country did not support the Academy this year, despite intensive advertising in the Press and direct approaches made to the various Provincial Institutes.

The Jury appointed to judge the Art and Sculpture sections also expressed disappointment in the work submitted by Artists. This year the Academy Committee invited well-known Artists to send in three works, of which two would be accepted. Unfortunately this scheme did not prove successful and is being referred to the incoming Committee for revision. The Jury's report concludes "the Exhibition however maintains a standard and the Jury would wish to place on record its appreciation of those artists who submitted of their best, realising the aim of the Academy. It is obvious that certain artists with "established reputations" did not take the Exhibition sufficiently seriously, and sent, in some cases, work far below their known standard which belied this "established reputation."

It is pleasing to report that the Sculpture Section maintained its high standard this year and that the Jury awarded the Academy's Gold Medal to Mr. Moses Kottler "for the works submitted by him and for his outstanding contributions to South African Art." The jury recommended also "that the Academy Bronze Medal be awarded to Mr. Gerard de Leeuw for an outstanding sculpture which he had also very beautifully cast in his own workshop." It should be noted that the Gold and Bronze medals have not been awarded previously.

For the first time in its existence of thirty years, members will find a balance sheet for the S.A. Academy along with the usual Financial Statements. It will be noted that the Academy's resources are very limited and must eventually find itself with a deficit unless steps are taken to make it self-supporting. It is clear that the Academy Exhibition is regarded in Art circles as a National Exhibition and this is borne out by the interest taken in it by the Press, the Public and by the number of entries from all over the Union. It would represent a great loss to Art in South Africa if the Academy were to disappear after such a long period of existence and the undoubted influence it has had for the good of art in the country.

JOINT PRACTICE COMMITTEE.

The Joint Practice Committee, established two years ago, forms a liaison between the professions of Architecture and Quantity Surveying and the Building Industry, and continued to function successfully.

Matters of common interest were discussed such as the Publication and Opening of Tenders, Small House Bureau Plans, Builders' Waiver of Lien, Municipal By-Laws as far as they affected tender prices, Building Control, and the

recent increase of the owner-builder with consequent loss of work to the Building Industry and Associated Professions.

FINANCE.

This Sub-Committee has, throughout the year under review, attended to the financial affairs of the Institute.

Although the general financial position of the Institute must be assessed by the combined Balance Sheet, it should be borne in mind that the various activities of the Institute are operated as separate accounts, so that the position of each may be readily ascertained.

Members will note that the South African Academy, a self-supporting activity which has been in operation since before the Act, has been included in this year's Balance Sheets. Most of the revenue accruing to the S.A. Academy is derived from a percentage commission on the sale of pictures, entrance fees, admission fees and sales of catalogues.

Among the other duties assigned to the Finance Committee is the control and operation of the "South African Architectural Record." From the Balance Sheets it will be noted that the Journal is again in financial difficulties this year. These are due to several problems which have been carefully studied and met by your Committee as best they can. The chief difficulty of the past was late publication with all its repercussions. This problem has recently been eliminated by the determination and drive of your Editor and his Board, with the co-operation of the Journal's Business Manager and the printers. Further difficulties which are continually before the Committee are increasing printing costs and increasing circulation, the latter resulting from the ever-increasing membership of the Institute and the Chapter. To meet the problem of increasing membership, your Committee has this year applied to the Central Council for financial assistance to operate the Journal. This subsidy is likely to be calculated on an amount per copy issued to members of the Architectural and Quantity Surveying professions. The Central Council has granted a direct subsidy of 3d. per copy and an additional loan of 3d. per copy which might be converted into a subsidy.

PRACTICE.

The Standing Committee on Professional Practice has done a large amount of work this year. The gratitude of the Institute is due to the Chairman and the Committee for their efforts on behalf of the Profession.

One inquiry was held into allegations of unprofessional conduct and the proceedings and result of this inquiry were reported in the Press.

PUBLIC RELATIONS COMMITTEE.

(1). *Exhibition at the Rand Show.*

An Exhibition with the theme "Design for Living" was held at the Rand Show. Photographs were shown of local architecture, Small House Bureau work, and National Housing work. A number of films of general architectural interest were shown.

Although well staged it was felt that this type of exhibition did not have sufficient propaganda value to warrant its continuance at the Rand Show in the future.

A meeting has been held, however, with the Architectural Students Society with a view to producing an exhibition of the type of the recent "Art of Architecture" Exhibition, during 1950. This matter is now being discussed.

(2) *Compulsory Employment of Architects—Clause in Title Deeds.*

About fifteen township owners, Municipalities and Corporations have been asked whether they would agree to the inclusion of a clause of this nature.

A few expressed interest, but most were unable to accede to the request. It is considered that the Committee should persist in this, as the agreement in a few cases may lead to others following suit.

(3). *Small House Bureau.*

The suggestion that a booklet of the Bureau designs should be published is being considered, but there is much preliminary investigation to be made.

Two large corporations made enquiries during the year concerning the use of Bureau plans for housing schemes. These have not so far eventuated.

Seven schemes were sold to individuals and there were about eighteen enquiries.

(4). *Presidential Badge.*

The design of this badge by Mr. Willem Hendrikz and its production by the Mint have been organised by the Committee. Delivery of the completed article is expected shortly.

(5). *The Pretoria Industrial Exhibition.*

Mr. Nunn was approached by the promoters of this exhibition with a view to the Institute assisting them in the design of their exhibition. The Pretoria members did a great deal of investigation and research and compiled a detailed report, concerning the 1949 Exhibition. This will be a very valuable document to guide the incoming Committee in the practical assistance which they may give to these exhibitions in the future.

(6). *Publication of Architects' Names in the Press.*

It is felt that the omission of architects' names from Press reports of Architectural matters precludes any publicity for the profession. This matter is now being carefully considered by the Committee.

(7). *Functions.*

A dance was held in November at the Moon Hotel. About 120 persons were present and it was agreed that it was an enjoyable function. A suggestion that a larger function in the nature of an Arts Ball might be held in future years is being considered.

Several successful functions were held which were well attended by the Members of the Profession. A Cocktail Party was given in honour of Mr. Chitty, who was on a visit to South Africa on a series of special lectures.

Many members attended the function on the occasion of the presentation of a wedding present to Miss Paiker, who was the Secretary to the Institute from 1946—1949.

PRIZES TO SCHOOLS OF ARCHITECTURE.

During the year your Committee donated the amount of 15 guineas each to the Schools of Architecture of the University of the Witwatersrand and Pretoria.

BENEVOLENT FUND.

During the year the Benevolent Fund has paid grants-in-aid amounting to £175 10s. 0d. and donations received amounting to £356 17s. 0d.

JOHANNESBURG BUILDING BY-LAWS SUB-COMMITTEE.

The Committee continued its discussions with the Johannesburg City Engineer on the provision of parking in buildings, and a compromise on the problem was submitted during the year to the Administrator. Members of the Institute have been advised of the amendments from time to time in the News Letters, but up to the present the Administrator has not approved of the new regulations.

The Committee dealt at length with the problem of advertising on buildings and the new proposals should assist in controlling the use of buildings as an advertising background.

Other matters considered by the Committee included minor alterations to the by-laws dealing with the use of corrugated iron in buildings, refuse disposal, small residential requirements of summer houses, fowl houses and swimming baths. None of these amendments have received the Administrator's approval as yet.

The Committee wishes to record its appreciation of the very helpful co-operation of the City Engineer and his executives in framing the revised by-laws, and it looks forward to the continued happy association in establishing its good relations with the Municipal authorities. To assist this, Members are especially requested to help the City Engineer's Department by early submission of plans before building operations commence, and prompt return when amendments are requested.

The Chief Factory Inspector also requests the Members of the Institute to make full use of the opportunities offered to discuss plans of factory premises before they are formally submitted for approval. The Committee has requested Members to colour the walls on the plans, particularly where alterations or additions are made, so that they can be clearly understood, but the Department advises that this is still not being put into practice by all the members of the Institute.

During the coming year several model sets of regulations will be issued by the Bureau of Standards and the Institute should endeavour to have these incorporated in the by-laws to replace some of the present legislation which members fully realise is out of date and does not permit modern methods of construction.

SALARIED MEMBERS' SUB-COMMITTEE.

This Committee had no occasion to meet this year. Salaried members are invited to submit to the Institute any points they wish to have discussed.

PROVINCIAL WORK.

As members are aware, after prolonged negotiations with representatives of the Provincial Administration a new agreement was reached under which Architects perform work for the Administration. The chief feature of this agreement being that the Architect becomes responsible for the employment of Consultants for an overall fee of 7% which includes both the services of the Architect and the Consultants.

It is too early to judge how suitable this agreement will be in practice, but it is hoped in due course and in the light of experience gained by practitioners to review the position.

It is understood that the Provincial Council's building programme is being held in abeyance at the moment due to the present financial situation and pending investigations into the high cost of building in South Africa, which are being carried out by the National Development Corporation.

By Order of the Committee,
J. LANGE,
Secretary.

THE PRESIDENTIAL BADGE OF OFFICE

At the commencement of the proceedings of the Annual General Meeting the President, Mr. Irvine Smith, welcomed the President-in-Chief, Mr. Tomkin, and expressed appreciation to him for having made a special trip from Durban to be present. He also welcomed the Vice-President-in-Chief and Chairman of the Executive Committee of Central Council, Mr. Austin, the President of the Chapter of Quantity Surveyors, Mr. Louw, and the Past Presidents of the Transvaal Provincial Institute.

During the course of the proceedings and following on a most stimulating address in which he traced briefly the history and achievements of the Institute in the Transvaal, from its early beginnings in 1892 as the first technical society to be founded on the Rand—the South African Association of Engineers and Architects—he invested the President with the new badge of office. In response the President said, "On behalf of my predecessors in this office and the members of this Institute, I wish to thank you sincerely for making the formal presentation of this



The Presidential Badge of the Transvaal Provincial Institute. The design was prepared by Professor G. E. Pearse in collaboration with Willem Hendrikz who produced the original from which the dies were made.

badge. I should also like to take this opportunity, Ladies and Gentlemen, of expressing on your behalf our appreciation to Mr. Tomkin for his interesting and encouraging address.

"For myself I am deeply honoured that, due to pure coincidence, I should be the first bearer of this badge and in the days to come the miniature will have for me a deeper significance for that reason."

Miniatures of the Presidential Badge were then presented to the Past Presidents who were able to attend the meeting.

ADDRESS OF THE PRESIDENT, MR. C. C. IRVINE SMITH

As we have a long Agenda which includes items of considerable interest I will endeavour to be brief in my address to you.

A topic which has received much publicity in recent months has been the alleged high cost of building in South Africa, and there has been a considerable amount of misguided comment on the present situation due, I feel, to the lack of a proper understanding of the character of the building industry in South Africa and its intimate connection with the cost structure of the country as a whole. One cannot isolate the Building Industry in a test tube and examine it out of its context and expect to arrive at an accurate diagnosis of any complaints.

To get a true picture of the industry one must examine it in its proper background and in its correct relationship to the National Economy. Such an examination will reveal a highly complicated organisation with deep roots in practically every other aspect of our national organisation. I propose dividing the factors which influence the cost of building into two categories; the first being those factors which are really outside the building industry but nevertheless exert a considerable influence on costs, and the second category being factors within the industry which affect cost.

In the first category is the industry's dependance upon the supply of large quantities of fabricated and semi-fabricated articles and raw materials which pass through a complicated system of transport, storage and distribution before reaching their final destination in any particular building. Some of these fabricated articles are imported, and much of the machinery used for the manufacture of locally fabricated articles is also imported. Therefore the consideration of costs in the Building Industry in South Africa must take account of conditions influencing the manufacture of fabricated articles and machinery in countries overseas.

From this it will be seen that the increased cost of production of fabricated articles and machine tools in other countries can directly affect the cost of building in South Africa. This brings us into the international field of economics, but the implication of these factors cannot be ignored.

As a result of devaluation, South Africa's purchasing power has been reduced and, combined with increased costs of production in other countries, we have to pay more for imported timber, more for lifts and electrical equipment, and more for sanitary and hospital equipment, to name but a few of the fabricated articles, so too do we have to pay more for machinery for the manufacture of such commodities as cement, more for builders' plant and machine tools—all of which are imported to this country.

So far I have hardly touched on the building industry as such, so let us move nearer the object of our investigation and consider some of the factors in the second category.

The imported articles, together with the locally manufactured articles and raw materials, have now to be transported to the site, but we find that that new American 3-ton truck costs approximately 40% more than it did a year ago, and the spare parts for the old one cost more; petrol, oil and tyres have all increased in cost and the garage charges for maintenance are nearly double what they were before—but this is the motor industry and not the Building Industry.

And at last we come to the site, which the owner tells us had he bought it five years ago he would have got it for half the price that he had to pay for it this year.

On the site we find the materials and the men, and the men tell us that the cost of food, clothes and furniture has

increased to such an extent that their wages must be increased, and, in addition, like all other working folk, they receive a cost of living allowance to help offset these increased costs.

That then is a brief review of some of the factors that must be taken into account when one studies the cost of building in South Africa if one is to arrive at a realistic result.

Clearly it is no function of the Architect to offer a solution to what is primarily an economic problem of national if not international dimensions.

Nevertheless the Building Industry is passing through a critical phase, and there are certain aspects which I believe to be worthy of consideration.

The first affects the building owner and relates to standards in the buildings that he sponsors. In the present circumstances I believe building owners must adjust their requirements to meet the prevailing conditions. This will result in a reduction in standards of accommodation and amenity.

It will mean smaller and simpler homes, more austere flat and office buildings in which greater use is made of standardised units, a greater degree of standardisation in hospitals and schools and a complete revision of the standards of design and materials used for public and civic buildings, generally.

Gone are the days of hand-carved panelled council chambers, elaborate Greek columns laboriously hewn out of granite and complicated moulded brass stair balusters.

In achieving these changes the Architectural profession can play its part but the change of approach rests with the building owner.

At this point I wish to make particular reference to the use by the public of Architectural Services. There is a tendency to-day amongst a certain class of building owner to dispense with portions of the recognised architectural services, such as detail drawings, the preparation of a specification and supervision of the construction of the building and the administration of the contract. Such a reduction in services inevitably results in ill-conceived buildings poorly planned with inferior details and finishes and decidedly less value for the building owner's money. There are to-day examples of such buildings in Johannesburg, which I venture to say will stand empty when accommodation becomes easier due to the inconvenience to tenants and the lack of amenity. They will be monuments to false economy.

There is also the tendency on the part of some owners to abandon the well-tried system of competitive tendering and the safeguards of the standard form of contract together with full architectural and quantity surveying services, and to dive headlong into the unknown depths of the so-called cost-plus system with all its uncontrolled wastages and inevitable increases in cost generally.

It is in times of difficulty such as the present that the professions should be relied upon to the full to produce the most economical design and make the best use of available resources.

My next point deals with the operative section of the Building Industry and refers to the poor output and the low standard of efficiency which exists in all trades. I do not believe that there is a quick solution to this problem, but I would urge that serious consideration be given to making the industry more attractive to our young men. A certain standard of general education should be set and provision made for a natural continuation of technical training in the selected trade on leaving school. Such technical training to run concurrently with apprenticeship in the Building Industry. It is only by adequate and efficient training that we can ensure greater efficiency in the trades later on, and improved output and efficiency are essential if costs are to be reduced. In addition to improving the standard of skilled workmanship consideration must also be given to the contribution of the non-European in the industry, for in this field there are immense opportunities for improvement in output and efficiency if only improved methods of training for non-Europeans could be introduced. However, the complications associated with this aspect of our labour force renders further discussion in a paper of this nature out of place.

Should a conference be held to investigate the present high cost of building in South Africa, I would urge that consideration be given to those more fundamental aspects of the industry which I have touched upon rather than an academic study of the wider issues which are more in the sphere of international economics and are therefore not likely to be effectively influenced by the recommendations of such a conference.

In conclusion I should like to assure the sponsors of the conference on building costs of the co-operation of the Architectural Profession in investigating this difficult and complicated problem.

PAINTINGS

by JEAN WELZ



APHRODITE. Oil. 1949.



FRUIT AND GLASS. Oil. 1949.

QUANTITY SURVEYING IN THE UNITED STATES

The following two articles on the subject of Quantity Surveying in the United States appeared in "Engineering News-Record" of New York in the issues of 9th. December, 1948, and 28th. April, 1949. They are reprinted by kind permission of the Managing Editor

THE COST OF ESTIMATES

by R. D. Sannit, Buffalo, N.Y.

Do Our estimates cost too much?

The answer is an emphatic yes: But, I doubt if any of us realise just how costly our present estimating methods really are.

Let us examine the entire system.

An architect or engineer designs a building. He prepares plans and specifications for its construction. He then gives these to several general contractors for competitive bids. The general contractors, in turn, solicit bids on all trades from the various sub-contractors. In some trades, they may get five or more sub-bids.

In preparing an estimate, the contractors spend most of their time on the quantity survey work. That is, on taking off materials for pricing. Each of the competing general contractors takes off the work his firm intends to do itself if awarded the contract. And all the sub-contractors take off their own work.

In that way, some items may be taken off fifty or more times by different firms between preliminary estimate and the final completion of the job.

This duplication—expensive though it is—is only one factor contributing to the high cost of estimates. Others are discrepancies, errors, and omissions on the drawings, as well as obscurities and ambiguities in the specifications. These other factors probably are inevitable in our current system; and they cannot all be resolved before the bid date. As a result, they are costly to the contractor if he overlooks them and gets the job. They are equally costly when he allows too much for them in his bid and thereby loses the job.

Thus, the quantity surveys we produce to-day are entirely too costly, and inaccurate besides. We would do well to correct this condition ourselves. For, if changes are brought about by outside economic forces—as well they might be—we in industry will find ourselves at a decided disadvantage.

In trying to remedy the situation, we should look for a method that will retain the benefits of our competitive bidding system while eliminating the waste and inaccuracies of its current estimating procedure.

I feel there is such a solution in the Guaranteed Quantity Survey System. Here is a brief outline of the plan :

Let us first train our estimators properly. We can do so through careful schooling at college, followed by a supervised on-the-job programme with architects, contractors, and sub-contractors. Such training will raise estimators' professional status.

Then let these men be licensed to work as consultants to architects in the same way as structural and mechanical engineers do. They will prepare the quantity surveys for all trades (except excavation). They will list the materials and work for direct pricing in the exact manner used by each trade.

The architect will issue the quantity surveys under his own name. He will give them to the general contractors when the job is advertised for bids. The general contractors will distribute these to the sub-contractors, and will bid the job in lump sum as they now do. Their bids, however, will be based on the plans, the specifications, and the quantity survey. And all three will become part of the contract documents when the job is awarded.

The plan is practical. It is not so revolutionary when examined in detail.

We know there is only one correct quantity survey for any building an architect designs—that is the exact amount of materials that will be incorporated in the building when it is completed. This amount can be predetermined accurately from the plans and specifications—if they are adequately prepared, and, if a system of controlled take offs is followed. The single quantity survey thus produced can be set up to serve all requirements for the duration of the project—from the budget estimate through the bidding stage, the ordering of materials, scheduling of work, and finally the partial payment estimate.

The main idea is that the quantity survey is to be guaranteed to the contractors bidding the job. This can be done safely if the estimators are thoroughly trained and if they use a careful system of checking. All variables, such as waste and equipment, in connection with the installation, will remain for the judgment of the contractors figuring the work. Only what is actually placed on the completed building will be included in the quantity survey.

Everyone in the construction industry stands to gain from a guaranteed quantity survey system.

The general contractor's office work will be levelled off from the peaks of a mad rush just before a bid opening. His office overhead will drop considerably, as most of the expense of figuring jobs is in the quantity survey. He will be able to figure as many projects as his building capacity will allow rather than as many as his overworked estimating staff can turn out. He will not be subject to errors of omission by his own staff or by those of his competitors, which cause them to take work away from him below cost. Finally, he will be taking less risk with sub-contractors who submit low bids on poorly prepared estimates, then want to back out when offered the contract.

In effect, all competing contractors and sub-contractors will be figuring on the same quantities rather than on their own version of what the building contains. Isn't the theory of competitive bidding based on all firms submitting figures on the same thing?

The architect will turn out plans and specifications that are minutely checked and corrected before he issues them for bids. This will eliminate much of the complicated addenda we now see. And it will dispense with most of the costly change orders and extras. Quantity surveyors give the drawings and specifications the most practical check they can get before actual construction. The architect will be getting the full benefit of this check. It is much easier and far less expensive to make the changes on the drawing board than in the field.

The owner will benefit in many ways. He will pay less for estimating work. And he will be paying only for the estimating of his own job. In spite of our present policy of "free estimates", the owner really pays for the work as part of the contractor's overhead charge. (A contractor sometimes figures ten jobs before he gets one.) The owner will also benefit through earlier occupancy of his building, for the time allowed for estimating will be cut considerably. On a large project, two to three weeks saving in time is valuable.

The guaranteed quantity survey system is a new idea. It needs a lot of planning and preparation before we can put it into operation. We know that our present estimating methods are far below the standard of efficiency and accuracy we have achieved in our other construction processes. But we cannot rush changes without careful investigation. There is too much at stake.

As the initial step toward the needed reforms, we might make a careful survey of estimating procedure throughout the country. We can gain much by getting the opinions of all concerned. To my knowledge, nothing along this line has been attempted as yet.

At present, any lowering of costs is welcome. So we will be doing the industry and ourselves a great service by making a start in that direction. It has been done in the modular system for co-ordinating the dimensions of building materials, so there is no reason why we cannot do it in estimating.

COSTS AND QUANTITY SURVEYING

by Leslie H. Allen, Newton, Highlands, Mass.

Considerable comment on quantity surveys has been stirred up by R. D. Sannit's article. Since I have passed the professional examinations for quantity surveyors in England and spent 15 years in quantity surveying over there, followed by more than 30 years in construction work in the United States, I can speak from experience on both sides of the water.

Bids were recently invited for a local high-school. Ten builders submitted bids, the average being slightly under 2,000,000 dollars. In one office the estimator spent 119 hours in taking off the quantities and two days more were occupied in pricing, visiting the site and assembling the subcontractors' bids. This firm estimates that the preparation of its bid cost about 500 dollars, and it is probable that the nine other contractors' costs were about the same. Sub-bids were required for 42 items, and 131 firms submitted bids for these. On some of the larger items such as plumbing and heating, each sub-bidder must have spent at least a week, and even on the smallest items a day or more was certainly occupied in preparing a bid. In the aggregate, 250 days or more were spent by subcontractors on this project, and the total cost of making up estimates amounted to about 10,000 dollars for the building trade.

If the contract had been awarded to the low bidder, he and his subcontractors at least would have been compensated for their outlay, though the unsuccessful bidders would have lost the money that they had spent. On this project all bids were rejected and the entire cost of bidding was lost.

This is not an exceptional case — it is typical of our wasteful system of bidding. The same procedure is followed every week in hundreds of similar jobs in every state in the Union. The quantity of material required for each building is the same no matter who gets the job, and it does seem inefficient and uneconomical for ten men to labour for two or three weeks to compute quantities when one man could do the work as well for them all.

On a similar project in England, by contrast, the architect would engage a quantity surveyor to compute the quantities of work and material required in each trade and would issue these to the competing builders. Each builder would spend two or three days in preparing and pricing his bid and most of the subcontractors would spend less than one day each. The cost of the quantity survey would be carried as an allowance in each contractor's bid, and would be paid by the successful bidder, or, if bids were rejected, by the owner.

About 35 years ago, the late G. A. Wright of San Francisco initiated a movement to establish a system of professional quantity surveying in this country, and the writer spent some time in addressing meetings and writing articles on the subject at that time. However, it soon became evident that there was no real desire on the part of contractors to change present methods, and very little was accomplished.

Nevertheless, there are now a few quantity surveyors in some of our larger cities who offer their surveys to competing builders and sometimes succeed in selling their surveys to three or four of the ten or twelve competitors, but rarely, if ever, to all of them.

The English system is about 75 years old. In its early days, contractors agreed on one man to compute quantities for them all. Each bidder included the surveyor's fee in his bid, and the successful contractor paid it. Architects soon realised that, since the cost of surveys made in this way were eventually paid by the owner, it would be to the owner's and to the architect's advantage to appoint the surveyor. This is now the common practice.

There are many advantages in this procedure: The quantity surveyor has more time to prepare an accurate survey, under better working conditions, being in closer contact with the architect he can straighten out questions that arise in the interpretation of plans and specifications far better than a builder's estimator can; the architect gets the benefit of a close scrutiny of his work by an experienced estimator, and errors and ambiguities can be corrected before bids are submitted instead of being the source of vexatious claims for extras later. Because all bids are based on the same quantities, there is not the wide spread between high and low bids due in many cases to inaccurate quantities taken off by the low bidder or to confusion in the assemblage of sub-bids. The quantity surveyor's familiarity with costs also enables him to advise the architect of the probable cost of each job in advance. Consequently, in England, it is very seldom that all bids are rejected because they overrun the owner's appropriation. Economies in design can be worked out before plans are completed and the time wasted by architects in redesigning and by builders in refiguring jobs—such a frequent occurrence here—is avoided.

In matters of detail, adoption of the British system would require extensive modification to ensure its usefulness here. In his desire to forestall claims for extras due to omissions or faulty descriptions, the English surveyor clutters up his survey with hundreds of insignificant items that the American builder never takes off and would not know how to price if he did. In the school job above referred to, the American builders' estimate occupied eleven sheets, but an English survey for the same project would have taken up more than one hundred pages. For this reason the British fees for such work are much higher than the American surveyor would have to charge.

One of the difficulties facing the professional quantity surveyor here, is the lack of uniformity in methods of measurement and estimating used by American contractors. The American Concrete Institute in 1915 published its "Rules for the Measurement of Concrete" (revised and reissued in 1926), but this lead has not been followed by others. If an American system comes into being, this problem will, in time, be adjusted by conference, and a standard method of measurement for each trade will be formulated.

Another problem is the lack of facilities for training estimators. Quantity surveying cannot be learned by attending a course of ten or twelve lectures at a technical school or by reading a book.

In my early days, the young English surveyor had to serve four years as an articled pupil and was not eligible to sit for the examinations of the Surveyors Institution until he had done so. If quantity surveying became standard practice here, it must be started by the estimators of the leading contractors, and they would have to train younger men in their methods and, by conference with each other, evolve a uniform system.

The first steps towards the inauguration of such a system will have to be taken by contractors, either mutual agreement on each job (to use the surveys of one man) or by the local builders' association underwriting the cost of forming a quantity surveying corporation, staffed by the best estimators in the city, and agreeing to use this organization's surveys on all jobs.

The cost of a survey made under such a set-up would be about three times the cost of a survey made in a builder's office (owing to the overhead expense of rentals, stenographers and incidentals), but since this cost would be divided between ten or more bidders, the cost to each would be far less than he pays at present for estimating.

The question of whether the accuracy of a quantity survey should be guaranteed is sure to arise, but this is not so serious a point as it seems to be. No builder

expects his estimator to guarantee that his work is correct. Under the difficult working conditions that prevail in most offices, it is usually approximately correct, but never exact and often there are large variations between the quantities calculated by the different bidders. If the same man who made that bid moves over into an office of his own under better working and with a professional reputation to maintain, it is not likely that his work will be less accurate, and it appears probable that his work will be much more exact than formerly. If the fee charged is less than the amount the builder used to spend on quantity taking, it is not reasonable to require a guarantee also. No surveyor could afford to guarantee his work unless his fees were high enough to enable him to carry insurance against error, and such insurance would be costly and difficult to obtain.

If the architect or owner appoints the quantity surveyor, the situation is different. But the architect does not guarantee the accuracy of his designs, and if, in the course of construction, extra work is ordered to remedy defects in design, the owner has to pay the bill. The same logic would apply to the quantity survey. This point rarely arises in England, and when it does the owner usually pays.

The quantity surveyors now practising in America generally confine their work to the trades estimated and executed by the General Contractor (earthwork, concrete, brick and stone masonry and carpentry). If quantity surveying is adopted here it will undoubtedly be limited, at first, to these trades. The logical next step will be to prepare surveys for all trades, and the general contractor will then supply copies of the quantities of plastering, painting, plumbing and the like to his sub-bidders. Some American surveyors do this now as a side line. The British contractor is so familiar with costs of subcontract work that he often prices most of the trades himself and does not consult with subcontractors until he is awarded the contract.

It is common practice in England to require the successful contractor to deposit a copy of his priced estimate with the architect at the time of signing contract, and this is used in the settlement of prices for change orders. The surveyor adjusts these by computing the quantities involved in each change and pricing them in accordance with the filed priced estimate. This is not an essential feature of the system and, as long as the appointment of the surveyor is made by the contractor could not be insisted on here. But as soon as the appointment of the surveyor falls into the hands of the architect he will probably make this a requirement of the contract.

It is hardly correct to claim that the cost of our wasteful system of bidding is borne by the owner. It is an economic waste borne partly by the building trade and partly by the whole community. In the high-school case first cited it could not be proved that the taxpayers of that town paid any of the costs incurred by the building trade on their behalf, and the disappointed bidders are not going to add their losses on this bid to the amount they bid on future jobs. But the taxpayers as a whole suffer through reduced receipts for income taxes, corporation taxes and the like.

The owner does pay, however, when half-finished or inaccurate plans are issued for bids. Only too often the contractor has to guess at the architect's requirements—and his guess is usually a safe one. All bids are usually higher when poor plans are issued than they would have been if the plans and specifications were clear and accurate. If a quantity surveyor worked on such plans, he would confer with the architect and get doubtful points settled before he completed his survey.

There is no doubt that all contractors deplore the present inefficient system, but the attitude of most of them seems to be "as it was in the beginning, is now, and ever shall be".

There seems to be no real desire by the building trades for any change; or if there is such a desire, there is no concerted effort to improve the situation. It is useless to expect any co-operation from architects unless builders make the first move. Architects would find it too difficult to convince their clients of the advantage they would gain in return for the expense involved. Such advantage can be realized by experience only, not by argument.

I am confident, however, that the day will come when professional quantity surveying will become standard practice in America, and I hope that this day is not far distant.

INCIDENTALLY . . .

A COLUMN BY GILBERT HERBERT

PERSONALITIES IN A PARK.

In Sefton Park, Liverpool, stands the skeleton of what was once a large iron and glass palm-house. Within the dome a gallery runs, and in the good old days the people of Liverpool would climb the winding iron stair leading to it, to admire the exotic display below. To-day it is derelict, and the stair rings with the clatter of children's boots, and the clamour of their voices.

Around the green marble base some six or eight sculptured figures stand; although it is difficult to determine their exact significance and relevance. One theory is that they all have something to do with botany and natural history, and the exponents of this hypothesis point out that Darwin, the father of natural history, is there, and Columbus and Cook, the explorers, who brought home all manner of strange plants from far-away places. But, on the other hand, if one reads the inscription on Columbus's pedestal, it implies that the Discoverer of America was the founder of Liverpool's greatness; which gives rise to the speculation that Liverpool, whose lifeblood the sea is, is here paying tribute to men of the sea. Look—next to Columbus is Henry the Navigator, and over there stands Mercator. The men who made the maps and financed the voyages and sailed the seas are the men who made Liverpool. But there is one figure in this oddly-assorted gallery who is neither botanist, although in a sense he had a sound knowledge of botany, nor an old sea captain; yet his place in this park has some justification in logic. The inscription on the pedestal reads: "Andre le Notre, most famous of gardener-architects," and Liverpool, in its garden, remembers a mighty maker of gardens.

SEFTON PARK.

When the Earl of Sefton planned his hunting park, there was only one snag—the people living on it : so he caused them all to be moved to the nearby village of Liverpool. To-day, much reduced in size, Sefton Park is the principal lung for the densely housed descendants of those villagers. It is a handsome park, but its homage to le Notre stops short with the erection of his statue, an afterthought as it were, and does not extend to the embracing of his principles of garden design. There is nothing of the Renaissance landscape about Sefton Park, but many of the ingredients of Capability Brown. It is a well tried recipe : to make a park, with romantic twisting paths between swelling mounds of grass, dam the stream and form a lake, and let the shadows of great clumps of trees dapple the green sward. I saw Sefton Park in winter, with much of its glory gone (although there is a special beauty attaching to winter trees), but it is a patch of freshness in a tired and dirty city.

ORDEAL BY SMOKE.

Each factory its smokestack, its tall chimney belching smoke; each train, each ship, each steamship bound up the Mersey belching smoke; each fire in each house in every grimy street in the city pouring black smoke across the sun : smoke in Manchester, smoke in Sheffield, smoke across the sun in Liverpool. With all apologies to my most kind Liverpudlian hosts, I must confess that it is a depressingly dirty city. St. George's Hall, the largest public building in Liverpool, and a seat of Justice, is black from cornice to pavement. When first I saw it, I thought it a sign of the severity of the Blitz; but I soon learned that it was not ordeal by fire and sword which had brought it to such a pass—buildings in Liverpool just get that way. And, the architects of Liverpool tell me bitterly, as long as the people of Liverpool keep the home fires burning, they are going to continue getting that way. The choice of a suitable self-cleansing facing is a very difficult one for architects to make. A small factor such as the texture of a brick can have enormous repercussions on the future maintenance of the building: for example, the wirecut bricks of the School of Architecture building have stood up remarkably well to some fifteen years of soot attack, but the rough textured bricks of the Philharmonic Hall are fast acquiring an overtone of black.

THE PHIL.

The Phil. has an especial place in the hearts of Liverpool's cultured elite. I refer, of course, to the Liverpool Philharmonic Hall and not to the delightful Victorian pub. of the same name, where many of the same elite are to be found eating buttered buns and Gorgonzola cheese, and quaffing mild and bitter. The pub., with its panelled walls and stained-glass windows, and its great mosaic-fronted counter, is itself worthy of comment, but I mustn't allow myself to be sidetracked; we are here concerned with the concert hall. When the old building, reputed to have the finest acoustics in England, was destroyed by fire before the war, the Philharmonic Society caused to be raised in its place a new structure, plain, severe, almost heavy in a Dudok sort of way, with small windows in unadorned walls of Dutch facebricks. It is a building which seems to imply: come inside, that's where my worth lies. Inside, all is monumentally simple. The walls and ceiling surfaces are stepped for acoustical reasons, and strong lines, concealing air inlets and lights, sweep dynamically from dado up wall, across ceiling, down opposite wall again to dado, in one

uninterrupted flow. There is but a slight suggestion of a proscenium arch, and then the auditorium treatment continues across the stage, so that the orchestra seems almost to be placed in the body of the hall, giving an intimate relationship between performer and audience, a relationship accentuated by the fact that the stage contains further tiers of seats beyond the orchestra for additional members of the audience.

BUILDING FOR ENTERTAINMENT.

The Phil. is also the headquarters of the Film Society, and for the showing of films a screen in a decorative surround (unfortunately not altogether in keeping with the chastity of the general design) rises from a slot in the floor, to fill the proscenium. What with gadgets such as these, and such problems as air-conditioning and acoustics, the problem of building a place of entertainment is to-day a highly skilled and complex one. I came by chance on a passage in a book the other day which purported to show that building for entertainment in an age gone by, although it had its problems, was not nearly so complicated as it is to-day. I was reading "No Bed for Bacon" in the slow train from Manchester to Liverpool, and came across this specification and contract for the erection of an Elizabethan playhouse. I would not vouch for its authenticity as a document—indeed, the authors, in a prefatory "warning to scholars," admit, one might even say boast, that "this book is fundamentally unsound"—but it seems to ring too true for a layman author to have sucked out of his thumb. In its brevity, and in its ingenuous disregard for professional ethics and the laws of copyright, I find it awfully appealing.

SPECIFICATION.

The situation, briefly, is this: Philip Henslowe is about to build a new theatre, albeit grudgingly, for his son-in-law, Edward Alleyn. "See," he says, "what I am about to spend on your art," and he produces the following document:

"The contractor, Katherens, is to take down the existing structure, and to build in its place another game house or plaie house fit for players to play in and for the game of bears and bulls. There is to be provided a tyre house and a frame to be carried or carried away and to stand upon tressels, sufficient to bear such a stage. It is agreed to build the same of such large compass, form, wideness, and height as the playhouse called the Swan in the liberty of Paris Garden. And the said playhouse or game place to be made in all things and in such form and fashion as the said playhouse called the Swan, the scantling of the timbers, tiles and foundations as is aforesaid without fraud or covin.

"1. Two staircases without and adjaining the playhouse of such largeness and height as the said playhouse called the Swan.

"2. 'Heavens' over the stage to be borne and carried away without any posts or supporters to be fixed or set about the stage. Gutters of lead needful for carriage of water that shall fall about the same.

"3. Two boxes in the lowermost storey, fit and decent for gentlemen to sit in, and shall make the partition between the rooms as they are at the said playhouse called the Swan.

"4. Turned columns upon and over the stage.

"5. Principals and forefront of the playhouse to be of oak; no fir to be used in the lowermost or under stones, except the upright posts or the back part of the said stones, all binding joists to be of oak.

"6. To new tyle with English tyles all the upper roof of the said playhouse.

"7. Also a louvre or storey over the said playhouse as it now is."

Which all goes to show that although times have changed, architects' phraseology goes on forever.

BOOK REVIEWS

VILLAGE DEVELOPMENT IN PALESTINE, by Henry Kendall, O.B.E. and published by the Crown Agents for the Colonies.

Henry Kendall, Government Town Planner during the period of the British Mandate in Palestine, sets out in this book to show, in two parallel sections, the development and planning of Arab and Jewish villages, his discussion following the now familiar pattern of most townplanning books and townplanning procedure, that of Survey and Plan. It is noteworthy for showing that such concepts as Regionalism, and such techniques as Zoning, have made their imprint on this hitherto undeveloped area of the globe.

Mr. Kendall discusses the British Mandatory Government's concern for the welfare of the Arab, and for the rehabilitation of his environment; and of the plans made therefore. The Regional Plan for Samaria is his particular interest, with its careful analysis of land use and allocation, and its concern with such vital and fundamental problems as soil erosion. Within the larger framework of the Regional Plan the author discusses in detail the replanning of a typical small Arab village, Salfit. Here the concept of townplanning seems to be remedial, with the emphasis on repair and cleaning up, with the straightening of roads, or rather lanes, and the removal of ruinous structures. Beyond some steps to control density, and the adoption in principle of elevational control, there seems to be little concession made to the modern trends of dynamic neighbourhood design. Except for school and tiny clinic, no adequate provision is made for community life, though in making this criticism it must be borne in mind that here townplanning is applied on a far smaller scale than we are accustomed to envisage.

The second section of the book deals with the planning of Jewish villages, carried out under the aegis of the Jewish Agency. Plans and illustrations of settlements are given, but unaccompanied by either descriptive commentary or critical analysis. It may be said of the book generally that the presentation of fact predominates over the drawing of moral.

With the dramatic changes that have come over the Palestinian scene and with the departure of the Mandatory Government, much of the content of this book becomes of academic interest only. But scientific planning on a widespread scale is continuing today in the new state of Israel, and we in South Africa should watch with interest how another small nation is attempting to build a new life in an old land.

G.H.

THE PLANNER'S NOTEBOOK. The Architectural Press: H. Myles Wright, Editor.

The subtitle of this book is "Compendium of information on town and country planning and related subjects," and this concisely sums up the purpose and scope of the Notebook. It is an anthology of opinions and facts dealing with all facets of townplanning from Advertising to Zoning, i.e. townplanning from A to Z. The information is comprehensive without making the book unwieldly and comprises two main bodies of contributions, namely "those that deal with the fundamental planning problems . . . and notes containing information on particular aspects of planning—legislation administration standards and technique."

Its title of "Notebook" is, as the publishers imply on the dustcover, perhaps a too modest one, but I would not go as far as they in claiming it to be a general reference book. Although its range of subject is vast, the crucial information that the planner is looking for, the particular aspect in which he is interested, always seems to be missing. However, the intending purchaser should not seriously be deterred by this apparent shortcoming. It seems to be a fault common to most reference books, and I and others have even had to level the same criticism against so exalted a tome as the Encyclopaedia Britannica. Thurber writes of it, admittedly in a different context, that "it moons along loosely, as if it were repeating information casually picked up at a rather noisy dinner party." That is to some degree the fault of the Notebook. In spite of its many statistical tables, and although it is always interesting, it never seems to have the hard and fast information one is looking for. Perhaps it is unfair to attribute this lack of precise information to the Editor, for the science of townplanning has not yet reached the stage where a body of information exists, to be catalogued by the anthologer. The chief virtue of the Notebook lies in the fact that it demonstrates the enormous range and extent of Townplanning, and while providing specialist information, it at the same time shows the specialist that his aspect of townplanning is only one amongst many.

G.H.

BASIC SURVEYS FOR PLANNING. Edited for The Association for Planning and Regional Reconstruction by Jaqueline Tyrwhitt, A.I.L.A., A.M.T.P.I., and W. L. Waide, D.T.P.(London), A.M.T.P.I. Published in 1949, for THE ARCHITECT AND BUILDING NEWS by Gilbert Wood & Co. Ltd., London. Price 5/- (postage 3d.). Size 8¾" x 6½", 42 pages with 3 fold-in illustrations. What are the basic surveys for planning? And what

purposes do they serve? On what information should those surveys be based, and are any special skills required for their compilation?

These are questions which a small group of specialists, conscious of the requirements of the new planning legislation, attempted to answer. The work of the group—which included, besides others, an industrialist, an agriculturalist, a sociologist, a geographer and a traffic expert—was made possible by the kind generosity of the Kent County Council, who not only placed at their disposal all the survey and planning material already compiled by the County Planning Department, but also willingly permitted the group to carry out a searching and critical examination into the manner in which the new planning code was being applied to the Kent problems, both in the towns and in the country. On this broad and practical basis the individual specialist members of the group designed their survey requirements.

The group, although deriving its inspiration from the Kent problems, has presented its work in a form intended for universal application and covering the requirements of both urban and county planning. The approach is simple and direct and all those concerned with the preparation of planning surveys will find this work of particular value. A comprehensive index is included.

Contents include :—

Surveys for Town and Country Planning — Basic Surveys for a County Development Plan — Basic Surveys for Development Plans within the County — Examples of Local Surveys necessary for certain detailed aspects of the plan — County Surveys of first priority — County Surveys of second priority — Basic Surveys for Development Plans for Towns within the County — Examples of Local Surveys necessary for certain detailed aspects of the plans — Appendix 1. Specimen Transport Survey — Appendix 2. Aspects especially affecting Kent.

TOWN AND COUNTRY PLANNING.

This journal, published by the Town and Country Planning Association has hitherto been a quarterly. With the issue for November 1949 it has reorganised as a monthly publication. It has been re-styled, including a more attractive cover and important new contributors will reflect the broadening of its editorial policy. "Town and Country Planning" has been a positive influence in the evolution of planning policy and legislation in Great Britain since 1904. It has an appeal to both the layman and the expert, its concern is with the interests of the planned as well as the planner. The journal will now give more space to planning in countries other than Britain, which will be of interest to the general reader and the expert.

ALSO RECEIVED

TRAFFIC SURVEYS: Practical Methods for Planners and Road Engineers.

A booklet dealing with the practical aspect of traffic surveys, and with their presentation, analysis and interpretation.

NOTES AND NEWS

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Journal of the SA Architectural Institute

PUBLISHER:

University of the Witwatersrand, Johannesburg

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