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# South African Architectural Record: Journal of the Transvaal, Natal and Orange Free State Provincial Institutes of South African Architects and the Chapter of South African Quantity Surveyors

**1920**

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# BUILDING.

THE JOURNAL OF THE ASSOCIATION OF TRANSVAAL ARCHITECTS
AND OF THE NATAL INSTITUTE OF ARCHITECTS.

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## ANNUAL GENERAL MEETING.

The tenth annual general meeting of the Association of Transvaal Architects was held in the Board Room, Exploration Buildings, Johannesburg, on Saturday, 28th February, at 8 p.m.

The President, Mr. D. M. Burton, took the chair, and among those present were the Members of Council and some 25 members of the Association.

The President, having declared the meeting duly constituted, expressed a cordial welcome to all the members present, and called on the Registrar to read the notice calling the meeting.

**1. Minutes of Ninth Annual Meeting and of Special Meetings.**

The Chairman said that these minutes had been circulated to members, and he proposed that they be taken as read.

This was seconded by Mr. Cowin, and carried unanimously.

**2. Annual Accounts and Balance Sheet.**

The Chairman called upon the Registrar to read the report of the Auditors.

Mr. Sinclair, in moving the adoption of the Annual Accounts and Balance Sheet, drew attention to the salient features thereof, pointing out that in view of the increased cost of printing, stationery, etc., the

raising of the subscriptions had been absolutely necessary.

Mr. Allen Wilson seconded the adoption of the accounts.

Carried unanimously.

**3. Council's Tenth Annual Report.**

The Chairman stated that the Report had been circulated to all members. It contained a very brief outline of what had been done during the year. If all that had been done was printed, it would make quite a volume. He invited members to make any criticisms or remarks they desired.

Mr. Kroll, in moving the adoption of the Council's Tenth Annual Report, stated that it was highly satisfactory, and again proved that the work of the Council was continuing to advance from year to year.

No further comments were forthcoming, and the motion for the adoption of the Report was seconded by Mr. J. S. Bowie, and carried unanimously.

**5. Presentation to the Association by Mr. D. M. Burton of a Roll of Honour.**

The President, Mr. Burton, stated that the most pleasing item on the agenda, so far as he was concerned, was the one he was about to carry out. It was his pleasure and privilege to present to the Association a Roll of Honour. It represented an idea he had of perpetuating the names of those who had done something for their country. Every name on the Roll represented someone who had felt a deep desire to rise to the occasion and do what he could to help his country in a time of stress. He thought it very fitting that the Association of Transvaal Architects should have something to hang on its walls, with a view to keeping those names before them. He thanked Messrs. Cowin and Powers for having designed the Roll, and thought all would agree that it was a very fine piece of work, and reflected great credit on them. It was a very great pleasure to formally present the Roll of Honour to the Association, which he now did. (Applause.)

Mr. H. G. Veale, on behalf of the Association, accepted the Roll of Honour, and at the same time wished to express the deep gratitude of the Association as a whole for it. At the same time, he would like not only to thank Mr. Burton for his presentation, but would like to thank those of our members represented on the Roll of Honour, and it would only be right for them to do so standing, and to silently say to the names represented there, "We thank you." (Members rose in compliance.)

**6. Presentation of an Address to Mr. Robert Howden.**

Mr. Veale said that the President had commanded him, on behalf of the Council, to present Mr. Howden, past President of the Association, with a small token of their regard. It was a small token, but represented a great deal of their feelings,

Mr. Veale, continuing, said that it might be appropriate for him to make the presentation, as he and Mr. Howden were the only two members (of the Council sitting at the moment) of the original Council of ten years ago. Well did he recollect when they sat on that Council—Walter Reid, the austere chairman; pale-faced Baker sitting next to him with his dreamy eyes and unkempt locks; Anderson, at the feet of the gods, sucking in wisdom; Archer Hosking, a good man, who came in full of quips and jokes; "Lord George Dickson," who used to talk and be a high-falutin' "Johnnie." But the same spirit that created that first Council was to-day in existence. And they were all working for one object, and so long as that maintained he thought they would all work together in a sense of brotherhood. They hoped to present testimonials of this description year by year. He had the very greatest pleasure in presenting Mr. Howden with this small token—it was a very small token, but it contained their hearts.

Mr. Robert Howden, replying, said he need hardly say that he thanked them very much indeed for the presentation. It was a surprise for him to learn, only a few weeks back, that he was establishing a record of ten years' continuous service. What he had been able to do he had never looked upon as a sacrifice, but as a pleasure. It had always been a pleasure to meet the members of the Association and discuss with them matters of importance and interest to their profession. He particularly appreciated it because it came from his fellow-professionals, and if he could give a word of advice to junior representatives of the profession, he would say, "Always strive to gain the confidence of your brother-professionals, and you will always gain the confidence of the public." He hoped to have the honour to serve for as many years in the future as in the past. It would be a great pleasure to him, and he felt that he had plenty of life left for a good many more years in the service of the profession. (Applause.)

**Election of President and Members of Council**

The President announced that no further nominations had been received to the list of names issued by the retiring Council. Foremost on that list was the name of the President, and the choice of the Association had fallen upon Mr. D. M. Sinclair. Personally, he did not know how he would have got on without the help of Mr. Sinclair, as he truly ever rose to the occasion when some sort of help was required. The President of the Association to-day required a good deal of help and sympathy.

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He had therefore very great pleasure in asking Mr. Sinclair to take the chair for the year 1920, feeling sure the Association would reap great benefit from his election. (Applause.)

The newly-elected President gracefully acknowledged the confidence accorded to him by members of the Association, and he was sure he would endeavour to do his best to carry on, and he hoped to be able to do honest work. The first duty as President was a very pleasing one, to present on behalf of the Council to Mr. Burton a photograph of his worthy self. Mr. Burton, as President, had always put himself out and given the whole of his time, energy, health and strength to carry on the Association's work; every single member of the Council considered it an honour to serve under him, and he had the very greatest pleasure in asking Mr. Burton to accept the photograph from the Association. (Applause.)

Mr. D. M. Burton, in accepting the presentation, said he thanked them most sincerely for the enlargement of a photograph of himself, and he did not know quite how to express himself. It was more than he expected, and the work he had done, he had felt he was going to undertake when he accepted the chair of the Association. Whatever he had done, he had tried to do conscientiously and well, and it was very gratifying to him to know that his efforts had been appreciated. He personally felt that he had done no more than past Presidents. (Applause.)

**8. New Vice-Presidents for the Year 1920.**

Messrs E. M. Powers and J. S. Donaldson having been elected Senior and Junior Vice-President respectively for the year 1920, briefly recorded their thanks and appreciation of the honour done them.

**9. New Members of Council for the Year 1920.**

The President announced that the following members of Council had been elected for the year 1920:—Messrs. D. M. Burton, N. T. Cowin, F. L. H. Fleming, M. J. Harris, R. Howden, D. A. McCubbin, G. E. Pearse, H. G. Veale, and Allen Wilson.

Mr. D. A. McCubbin stated that he was not rising to thank them on behalf of the Council, because other members might like to say a few words. Personally, he considered it a great honour to be returned to the Council again without election. He would really have liked to see an election. And though it was a very great honour for a Council to be returned without election, he thought it would have shown a little more interest in the affairs of the Association if there had been other names put forward, and thought it was always a sign of a live interest when there was an election at the annual general meeting of Council members. He begged to thank them for his re-election.

**10. Election of Auditors for the year 1920, and to fix remuneration for the Audit for the year 1919.**

Mr. Burton proposed that the retiring Auditors be re-elected, and that their remuneration for the past audit be fixed at twelve guineas. He stated that the work of the financial side of the Association had grown considerably, and it now took three days for two clerks working continuously to go through the Association's books.

The proposal was seconded by Mr Waugh, and carried unanimously.

**11. Housing and the High Cost of Living.**

Mr. Cowin: Mr. President and gentlemen,—Our ex-President stated that this question of Housing was the most important matter at the present time. I think you will agree with me that the Parliamentary election is the most important matter at the moment. As architects, I certainly think this is a matter that comes very near to us, and I certainly think it would be a dereliction of duty if we did not all go carefully through the Housing Commission's Report. I have had such an opportunity, and there are several points on which I am at variance with the report, and I propose to bring up a resolution in connection with one aspect of it. There are, however, one or two matters which are outstanding in it, and one particularly is this, that if any big scheme of housing is going to be undertaken—as apparently it must be undertaken as a matter of extreme urgency— it will have to be undertaken by the Government. We know what Government work is. We must see that our interests are safeguarded, and this huge programme of work—estimated at £7,000,000, and in my opinion the houses will not be erected for twice or three times that sum—but if that huge sum is to be spent by the Government, the architectural profession must be considered. This work should not be carried out departmentally. The point I wish to emphasise is, that we should see that in this housing scheme we are getting a good type of building put up. There is nothing in the report to say the Government is going to insist on a high-class of building. If you throw people, like animals, in hovels, they will behave like animals. Poor whites, if housed in degrading circumstances, find it difficult to improve themselves. I think this is one of the matters we must look to, and try to insist on the Government establishing a high standard of building, not only using suitable materials, but obtaining sound workmanship and sound architecture. There is a clause in the report to the effect that competitive designs will be obtained by competition or otherwise, and these plans will then be given out wholesale to the local authorities—apparently so as to obviate the necessity of individuals paying architects' fees. If we as an Institution are not going to fight against that, we might as well close down altogether. On this particular point of good building, I notice in reading some of the Home papers, that the

Commission there insisted on a high standard. They have insisted on a good specification, and the designs, as you are probably aware, are prepared by eminent and leading architects. The cost has far exceeded the official estimates of expenditure. The people are saying that it is impossible to carry out the scheme in toto, and that some relaxation of these specifications should be adopted. I quite agree that there are many difficulties in regard to a high standard, but there should be no relaxation. It is better to build fewer houses and get good ones, than relax the standard in any way. And, after all, why should not the extra cost be an addition to the National Debt? If you cannot get an economic rent, and cannot let the houses as a payable proposition, why should not the Government bear the burden by tacking on the extra expenditure to the National Debt? It can spend thousands of millions on a war, but when it comes to building a decent class of house, there is an outcry. Jerry buildings, I venture to say, the people in this country won't put up with, even in native locations. We have got a stage further than building with paraffin tins and soap boxes. I think I have said sufficient to emphasise the point that we should urge upon the Government the necessity for maintaining a high standard of building, and should insist on high-class work, sound workmanship, materials and architecture. I have much pleasure in putting the following resolution:—

> "That this Association urge upon the Government the necessity of maintaining a high standard of building in any Housing Scheme that is adopted, not only from an economical point of view, but in order to raise the standard of efficiency of the artisans in the country, and provide for the moral and social well-being of all races."

In regard to the efficiency of artisans, I know when I go on to a building where there are a number of Afrikanders working, and I am always a little disquieted. It is no disparagement to say this—it is because they have not had the opportunity. I am not going to say that there are no decent Afrikander workmen, but many of them don't know anything about building at all. We should see that the class of building turned out is tip-top and be satisfied with nothing else but good work.

Seconded by Mr. Kroll.

Mr. McCubbin: I don't wish Mr. Cowin to think I am totally against his resolution, but I do think that before this Association adopts a resolution like that, the matter should receive its full consideration. At the present time there is a crying need throughout the country, not only in the towns, but in the outside districts, for houses—roofs for the people to live under. On the railways it is deplorable, and I do think that if we press this resolution as it is worded we would hamper the Government by insisting on a high standard of work—because we cannot get it, it is absolutely impossible. Mr. Cowin has touched on the vital point—in this country the Afrikander is a poor workman—he is a deplorably poor workman. The only real artisans in the building trade are the men from Home or their descendants. It is not the Afrikander's fault—he is only beginning to learn. We have not enough highly-trained workmen to supply our wants. Now we are going to ask the Government to insist on a high standard of building—it is utterly impossible to get it, and we should not pass the resolution as it is worded. We have not got a Public Health Act yet—in the outside towns there are no regulations in regard to building back-to-back, superficial air and light, or ventilation. We cannot at this stage ask for a high standard of artistic architecture. I think the Government ought to improve the Municipal Building Bye-Laws. Apparently—and I think Mr. Waugh will agree with me—there is nothing in our building bye-laws to stop jerry-building; there is nothing at all, and I think we should get the Government to give municipalities wider powers in this respect. This would do far more than passing a resolution like this, which reads very well, and the sentiment of which is correct. I think we all agree that it is not right to insist upon anything that will hamper the Government in erecting houses quickly. We should also remember that we cannot attain that artistic sense that we would like to develop in this country, because at the present time we are tied down to standards, stock sizes, etc., and I am afraid that Mr. Cowin will really have to entertain the view that we will have to put up with standard houses if we are going to have many houses built.

In a place in the Free State houses were wanted built to four different types of elevation. When I went down there, I found to my horror that a row of sixteen houses were erected to one elevation. That, I take it, is one of the things Mr. Cowin wants to avoid, and it is one of the great dangers of type drawing. We ought to impress upon the Government to avoid that dreadful monotony of putting up a collection of buildings so that a man cannot go home in the dark not knowing whether he is entering his own or his neighbour's house.

Mr. Burton: With reference to the Afrikander, and the remarks made by both Mr. Cowin and Mr. McCubbin, I think it is generally agreed that the Afrikander is not a first-class workman. That is, he does not understand the intricacies of the building trade. At the same time, we all know that this same gentleman demands the same wages as the skilled man. The trouble has been in the past, and will probably continue in the future, that unless our Labour Party agree to a minimum wage instead of a standard wage, there will be no incentive for a man to become a really

competent workman. At the same time we have Trades Schools, which undertake to teach the youth to become proficient at his business. Unfortunately, the average youth does not take advantage of the facilities afforded him. Mr. McCubbin goes on to remark that it will be placing difficulties in the way of the Government if we put forward such a proposal as Mr. Cowin makes. With reference to the higher standards and lack of bye-laws throughout the country, the Association is at present in negotiation with the Johannesburg Municipality with a view to securing certain amendments. At the same time, the misfortune in Johannesburg is that certain areas are eliminated from the enforcing of certain bye-laws—at least it is so in certain quarters, as most of you know—the coolie areas, and so forth. It has been said that the municipal inspectors are all that is necessary, and that the architect is not an essential factor in good building. That, gentlemen, is a fallacy which all of us present are fully aware of. To come to Mr. McCubbin's point in reference to stock fittings, I am personally of opinion that you can make a building very presentable even if everything in it is "stock." The question of the window being a stock window or any other stock fitting, does not matter so long as it is placed in the proper position. We have in this country to suffer quite a lot of difficulties with reference to the shortage of material, and we must at this stage carry on with any imported article which we can get, and make the best use of stock material. Let us get the building up, the architects making the best use of the material at their disposal, and they will get fairly presentable cottages, or even mansions. Mr. McCubbin's proposal is, in my opinion, to attain this. The Governments in Europe are to-day struggling with this very problem, and there is no doubt about it that it is impossible for the average man to build a respectable habitat for himself at a reasonable price—at any rate, within his means. Gentlemen, it is leading us to a very bad state. People are having to borrow large amounts of money in order to be able to build a house, to have a roof over their heads. I think the time has come, with building materials so expensive, for the Government to come to the assistance of the municipalities or of the people—I am not at the present time disposed to argue as to how they should do it—but we will have this housing problem before us, unless we can appeal to the Government to render some sort of assistance somehow. I think, as I said before, that this proposition of Mr. Cowin's is a step in the right direction, and I have much pleasure in supporting it.

Mr. Waugh: I rise to support Mr. McCubbin. I don't think the resolution is helpful to the Government, and I will not go through the arguments that Mr. McCubbin has brought forward, because I quite agree with them. The position to-day is a very serious one, and we should do nothing that would tend to hamper the Government. In producing first-class bricks you inevitably produce a number of second and third-class ones at the same time, no matter how much you try to avoid doing so. The bricks are useful enough, and large numbers of homes in Johannesburg are built with such bricks. One only has to look to the wilds of Australia to see how they provide themselves with houses—the houses would not pass muster in Johannesburg, but they are very comfortable and satisfactory, and are built in peculiar ways—sometimes built with wattle, and filled in between with mud, and then stripped bark from trees is put on top, and you get even the ridge made of bark; and they are very satisfactory for the position they are in. I don't suggest we should have them in Johannesburg, but at the same time I think the resolution is likely to do the Association harm, as the position is a very serious one. The shortage of houses is a social evil of great magnitude, and likely to lead to revolutionary feelings. There have been some remarks about light, and building back-to-back. There is a Health Act to-day, and it has provision for light and other things, and has been in force for twelve months. Mr. McCubbin no doubt refers to some of the country hotels which he has no doubt experienced. Nearly every hotel in this country in the outside districts offends in the most disgusting manner against the bye-laws. I cannot support that motion as I understand it because I think it is going to hamper the Government in doing something—doing it sufficiently quickly to relieve the existing dangerous position which is arising in regard to housing.

Mr. McKenzie: I think the Government should advance money on fair terms to people who want to build. Let them build their own houses and employ their own achitects, carrying on in the ordinary way. With regard to quality of work, possibly the Africander does not do it in the same way as a home-trained man. The contractors must see to that. If they employ a man, they are going to get the best out of him, even if they have to employ inferior labour at a time when labour is scarce. This will eventually right itself. With regard to the high cost of labour at present, there is no incentive for men to make themselves efficient. When the Government or the municipality erect houses of the wrong kind, they are only erecting the slums of the future; whereas if a man is in a house which he hopes will be his own, he gets that house improved with all the improvements that occur from time to time, and further, that man has a stake in the country.

Mr. Fleming: I think, as architects, we should, in dealing with a motion like this, bring design in, and suggest the addition of the words "and design" after the words "high standard." It deals with the proper use of material, etc., and if stock material is

used, it can be nicely used, and it can be badly used. I feel we ought to make some kind of suggestion, and I think we ought to make it quite clear what we do feel about design—there should be no panic measures, and no truckling to economy.

The resolution, as amended, was then put to the vote, viz.:—

> "This Association urges upon the Government the necessity of promoting a good standard and design of building in any housing scheme that is adopted, not only from the economical point of view, but in order to raise the standard of efficiency of the artisans in the country, and provide for the moral and social well-being of all races."

This was carried unanimously.

It was further agreed that the resolution as above amended be forwarded to the Minister for Public Works.

Mr. Powers drew attention to Clause 164 of the Housing Commission's report, and stated that its effects would be detrimental to the architectural profession as a whole. He saw no reason why architects should be the ones to suffer—they should be considered by the Government just as any other individuals are considered. It was not suggested in the report that contractors should do their work at cost price, and yet it is suggested that architects' fees should be saved. He put forward the following resolution:—

> "This Association strongly deprecates the recommendation in Clause 164 of the Housing Committees report that type plans be adopted in order to obviate the expense to individuals in architects' fees as unsound, uneconomic, and a gross injustice to a profession that should receive every encouragement from the State."

He further stated that they certainly looked for some consideration, and he thought there was a great danger of the work becoming of the "type" variety, such buildings being erected ad lib throughout the country. With regard to the remarks about "stock" doors and windows, and "stock" material generally, standardisation, of course, cheapens—it is not that the material is necessarily cheap, and standardisation does not necessarily mean inferior material. With regard to architects' designs, it was suggested that the architects should prepare designs which would be taken over and the work carried out without further reference to them. This was not at all in the interests of the architectural profession. In Great Britain, where similar housing schemes were being considered, the various architectural bodies had protested that architects should supervise the carrying out of their own designs in a graduated scale of charges. This principal has now been adopted by the Home Government. He, therefore, proposed the resolution standing in his name.

Mr. Allen Wilson seconded, the resolution being unanimously adopted.

**12. Departure of the Governor-General, Lord Buxton.**

Mr. Fleming said that he thought the impending departure of the Governor-General of South Africa afforded an opportunity for bidding farewell to Lord Buxton in graceful words, and at the same time there were a few thoughts which might be considered. The Governor-General of this country is in a most difficult position. Lord Buxton has suffered the extreme bitterness of personal loss in the war. He is, as representing the King and the British people, as it were, hedged round by a fence of reserve which prevented him from coming out and asserting his own individuality as much, perhaps, as an active-minded individual, differently placed, would be able to do. If anything, they, as an Association, were to blame if they had neglected—and he rather thought they had—neglected to take every opportunity of approaching the greater men in this country, and of trying to interest them in the things which interested the members of the Association. He felt that Lord Buxton had always shown himself a man of great public spirit—a high-minded man and quite keenly interested in all matters really affecting the general welfare of the country. (Applause.) He thought that if they had an opportunity—and he realised that during the war things were difficult and they could hardly have done it—but if they had approached him more than had been done, to take an interest in what the Association was doing and trying to do, they would have found that he would have shown considerable interest. He proposed to move, as a resolution, a few words bidding farewell to Lord Buxton, and in doing so would remind them that Lord Buxton had frequently offered to stand at the head of the movement for the S.A. Academy, which was a great honour. The Academy came at the very end of Lord Buxton's term of office here, and as far as they were concerned the Academy was only the beginning of the beginning of what they hoped might happen in this country in regard to architectural design. If they did not believe in themselves, no one else would believe in them, and if they had confidence in themselves they might be quite sure the general public would be interested in them. It was for the Association, in the first place, to show a lively interest in everything which could affect the progress of architectural design and the development of taste generally. He felt they ought really to see to it that they did their work properly; it would be infinitely better for them if they had a little less to do in keeping the wolf from the door—they were doing the utmost they could to

make it come about by encouraging the education of architects. If it was going to be a policy of the Association they should make every effort to take active steps to encourage the education of architects, and to arouse in the public, from the bottom to the top, a higher appreciation of the beauties of form and design. He was sure the public would enjoy their work, and they would see a wonderful transformation in this country. He thought that was the sort of thing they could interest people like Lord Buxton in if they tried. He had great pleasure in proposing the following resolution:—

> "The Association of Transvaal Architects, on the occasion of its Annual General Meeting, recognise with sincere regret that during the ensuing year His Excellency the Governor-General, Lord Buxton, will conclude his extended term of office. The Association realises that the personality of Lord Buxton, revealed in his alert and sympathetic attitude towards every broad interest and sentiment of the community, has been of the greatest value in South Africa. In losing Lord Buxton, the Association feels that the country will be the poorer; the architects will lose an appreciative and kindly critic and a good friend. The Association wishes Lord and Lady Buxton God-speed, long life, and every happiness." —(Applause.)

Mr. Veale seconded the resolution, which was carried unanimously.

**13. The South African Academy.**

Mr. Burton said that the idea of a South African Academy emanated from a suggestion of his own during the year and submitted to the Arts Committee of the Association, and he was sure that there was every possibility of it being an immense success; he was sure that not only achitects, but everyone throughout South Africa would appreciate the advantage of lending whatever support they possibly could. It was hoped to obtain before very long a Royal Charter for the South African Academy; but it would be necessary to wait and see what support they were accorded to it with reference to the first exhibition. So far, quite a number of architects had come forward with offers of assistance, and in an undertaking of this description it was not desirable to ask outside people to support it in the way of funds until they had proved what they were capable of accomplishing. Several members of the Association had already come forward in a splendid manner and offered their support. (Applause.) At the same time, the scheme should not be crippled for the want of a few extra pounds, and to any member who had not up to the present come forward, he would say they would possibly require a considerable amount of money. They had spent fairly liberally in order to accomplish what they had set out to do, and he hoped members would do what they could by way of active interest in it.

**Architectural Classes.**

Mr. Spicer referred to the work of the architectural classes at the School of Mines.

Mr. Sinclair stated that the Council would have to take into very serious consideration as one of its principal duties the question of training young architects, and there was not the slightest doubt that the Council would consider the whole question. It was gratifying that Messrs. Spicer and Pearce were on the Council, as they would be available with their experience and advice to discuss the question and advise the Council. The Council would do everything in its power to bring about satisfactory results.

Mr. Burton proposed the thanks of the Association to the Editor and Assistant Editors of the Journal. They appreciated the amount of work put in, and their best thanks were due to those gentlemen who had helped the Journal and in any way contributed to its success.

Mr. Powers, in referring to the Journal, said that in thanking them for the remarks which had been made in regard to the Journal, he would point out that its success depended upon contributors very largely. They were sometimes rather short of matter, and he would like to urge on members not to be backward in sending forward matter which may be of interest. Anything of interest to the profession would be welcome. They had not yet been in the position of having to hold over any matter for the next issue.

There was another matter he would like to bring forward for consideration. At the Cape there were now some eight or ten members. The Association was now represented at the Cape, and it had occurred to him that it would be a very good scheme for the Cape members to form themselves into a committee of the Association on similar lines to the one in Pretoria. If such a committee were formed, many difficulties experienced in the past would be done away with—the Association could keep in touch with such a committee, and they could let each other know what was going on at each end of the Union. He put forward the suggestion for consideration, as some very good work might be done in regard to the future South African Institute if such a committee were formed.—Agreed.

Mr. Bowie moved a vote of thanks to the members of the Benevolent Fund, and to those generous donors

This was carried unanimously, and the meeting terminated at 11 o'clock p.m.

## THE NATAL INSTITUTE OF ARCHITECTS.

The Annual General Meeting of the members was held in the Secretary's office, Field Street Buildings, Durban, on the 5th inst. The President, Mr. W. S. Payne, A.R.I.B.A., in the Chair.

The Minutes of the last Annual General Meeting were read and confirmed.

The President, prefacing his report, thanked the members present for their attendance, and said: The year has been a memorable one in that the Great War has been formally brought to an end by the signature of Peace.

The Council meetings of the Institute have been well attended throughout the year, and matters of interest to the profession generally have received due attention.

The Durban Corporation have from time to time placed commissions in the hands of local practising architects in accordance with the practice of the past few years, and according to a recently affirmed resolution of the Town Council.

Members of your Council have been invited to act in connection with local War Memorials, and have taken an active part on the Municipal Joint Committee.

An Architectural Registration Bill is of the utmost importance to the profession, and a conference, at which I had the honour of representing the Natal Institute of Architects, was held at Cape Town in January. The resolutions adopted at this conference were endorsed by a largely attended Conference of Natal Architects, held later in the year in Durban.

During the year under review, communications were sent to the Durban Town Council and to the Eshowe Local Board taking exception to the conditions of competitions promoted by these bodies, in each case probably with good results.

A Draft Petition, signed by practically all Natal architects, was presented to the Provincial Council through one of the local members with the object of inducing the Public Works Department to engage local architects to design and superintend Government work carried out in the Province, instead of, as at present, doing the work departmentally.

The present Conditions of Contract have been under discussion on more than one occasion, and it has been decided to obtain legal opinion on one or two important points.

A Special General Meeting was called during the year in connection with the revised scale of professional charges adopted by the Royal Institute of British Architects, but no quorum being present, it is to be presumed that the profession locally is satisfied with the old scale, which is an excellent sign of the times.

It is satisfactory to note that our membership has been maintained. Two new members have joined during the year, and there have been no resignations.

Looking to the future, it appears to me that great benefits would result to the profession by the establishment of registration throughout the Union, and I am sure this Institute will greatly welcome the next forward move in this direction. Union registration is the object to be aimed at, but failing this I think your Council should seriously consider the advisability or otherwise of moving in the direction of local registration, as a step to an ultimate object.

Thanks are due to the R.I.B.A. and other allied societies for their journals and calendars received.

In accordance with the general rules of the Institute, your Council retires, but members are eligible for re-election.

In conclusion, I wish to place on record the debt we owe our Secretary, Mr. Chaplin, for the great interest and care he has shown at all times in the affairs of the Institute.

A hearty vote of thanks was accorded Mr. Payne for his year of presidentship.

The following gentlemen were elected members of the Council for the ensuing year: Messrs. B. V. Bartholomew, A.R.I.B.A. (President), G. T. Hurst (Vice-President), F. J. Ing, Thos. Read, Lowell Mason, Wallace Paton, F.R.I.B.A., and E. O. Payne, A.R.I.B.A.

## MUNICIPALITY OF PRETORIA.

*Notice No. 28, of 1920.*

### COMPETITIVE DESIGNS.

WAR MEMORIAL, CHURCH SQUARE, PRETORIA.

Designs are invited for the proposed War Memorial to be erected in the centre of Church Square, Pretoria.

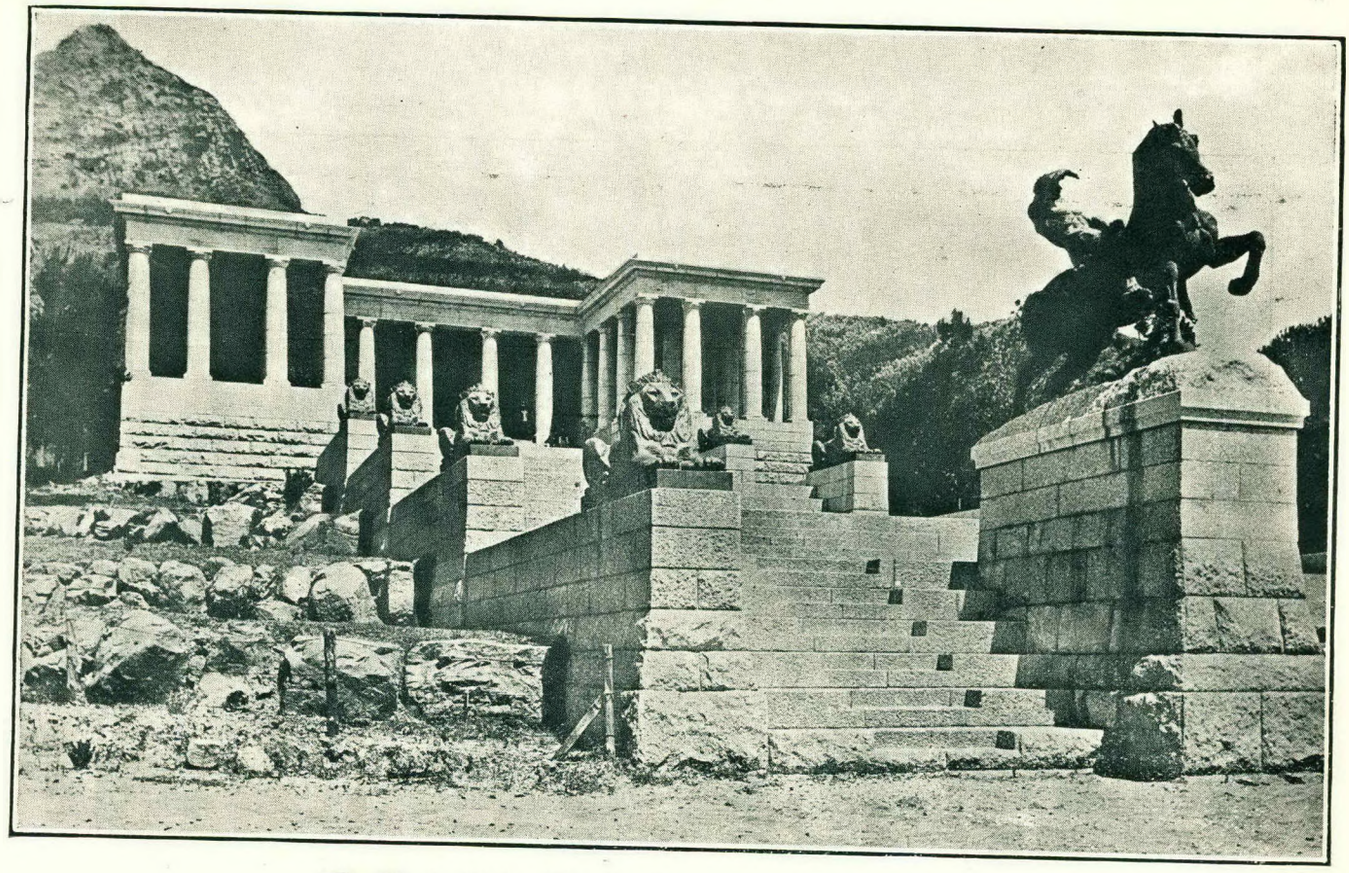
Premiums of £75 and £25 are offered by the War Memorial Committee for the first and second premiated designs.

Conditions of competftion, etc., may be had on application to the undersigned on the receipt of cheque for two guineas.

Designs which must be under nom de plume, are to be delivered to the Town Clerk, Municipal Offices, Pretoria, not later than the 31st May, 1920.

M. G. NICOLSON,
TOWN CLERK.

Municipal Offices, Pretoria,
16th March, 1920.



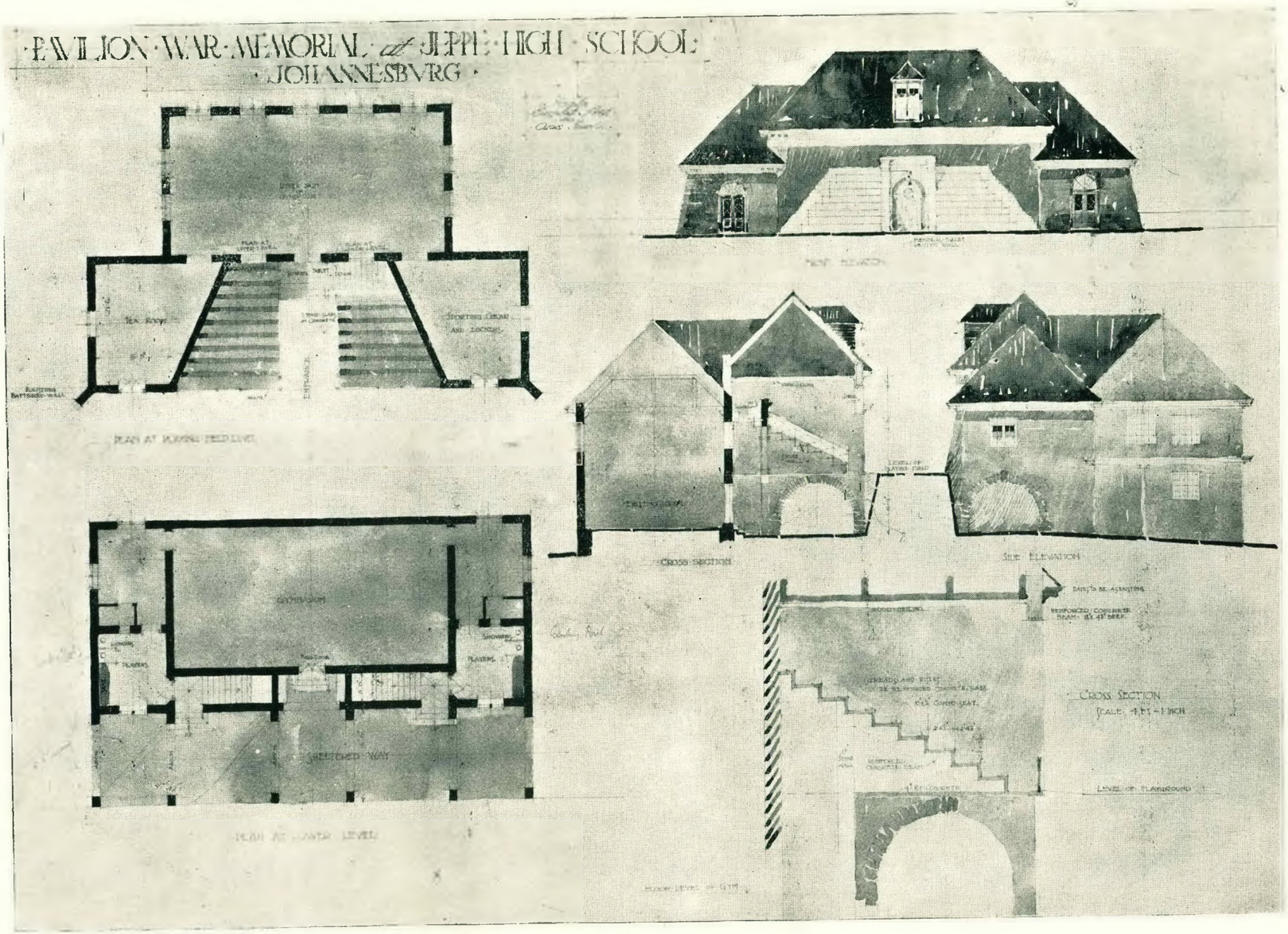
The Rhodes National South African Memorial at Groot Schuur.



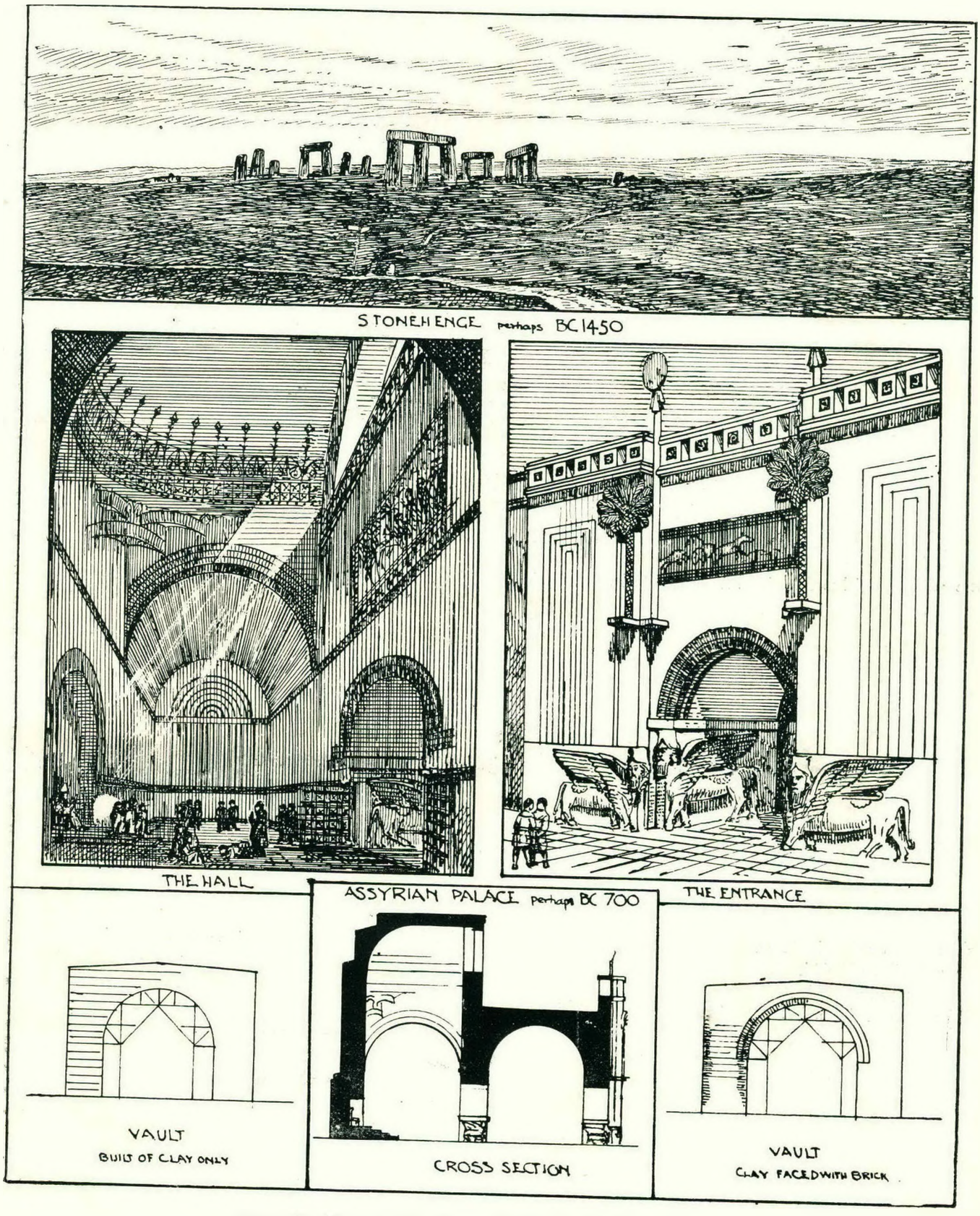
The Horse Fountain, Port Elizabeth.

INSCRIPTION ON TROUGH.

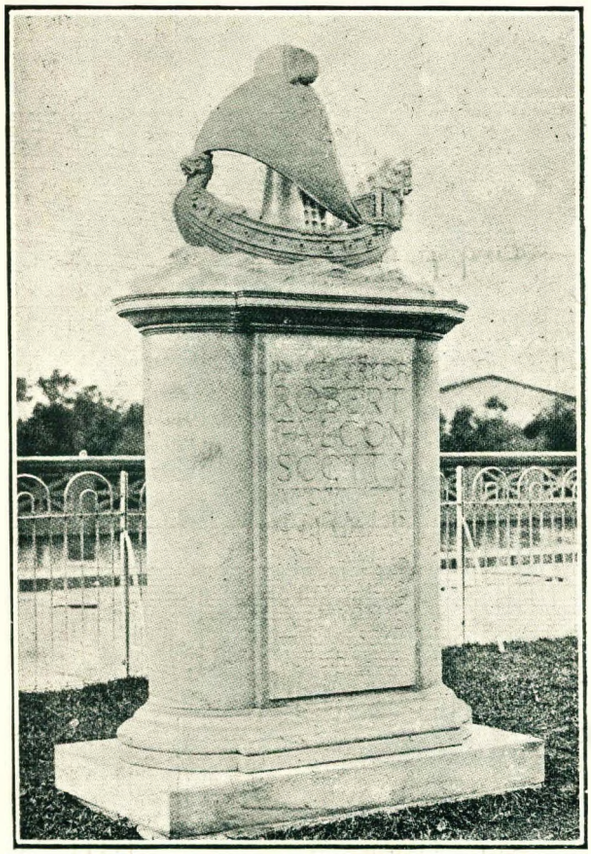
"Erected by public subscription in recognition of the services of the gallant animals which perished in the Anglo-Boer War, 1899-1902."



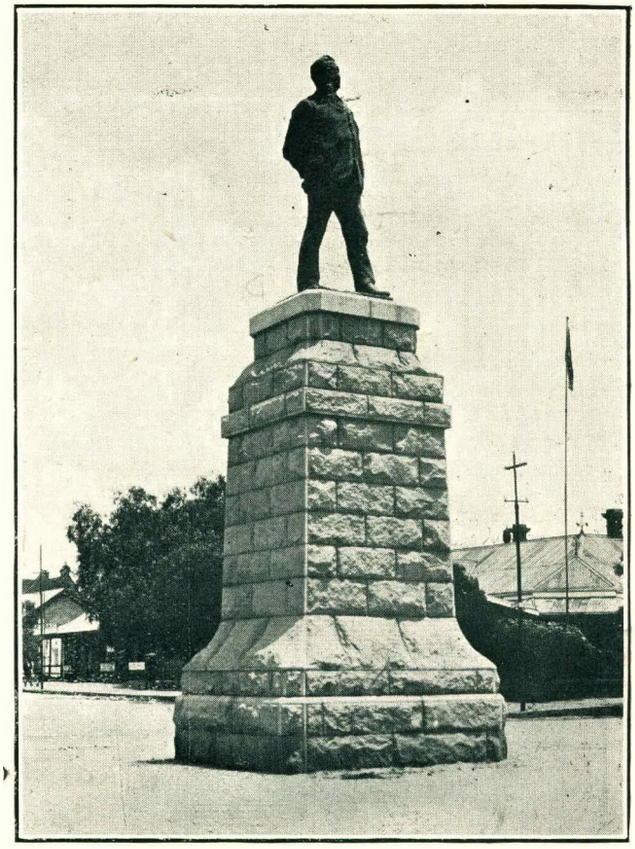

Premiated Design.—Mr. J. B. Dey, Pretoria.




Illustrating "Progress"—Drawn by G. W. Nicolay, M.S.A.



Capetown's Memorial to Captain Scott and his Gallant Comrades.



The Rhodes Memorial Bulawayo

"He'd crossed two hundred rivers,
Through tribes of bold hostiles
Within ten days he'd ridden
Six hundred English miles!

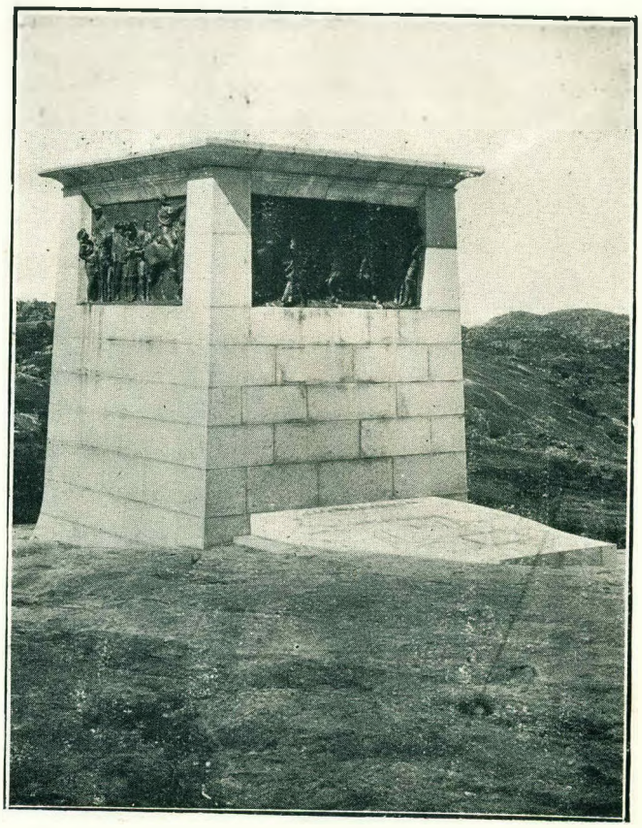



'Twas gallantly accomplished,
That daring glorious ride,
Through wild and unknown country
Without a chart or guide

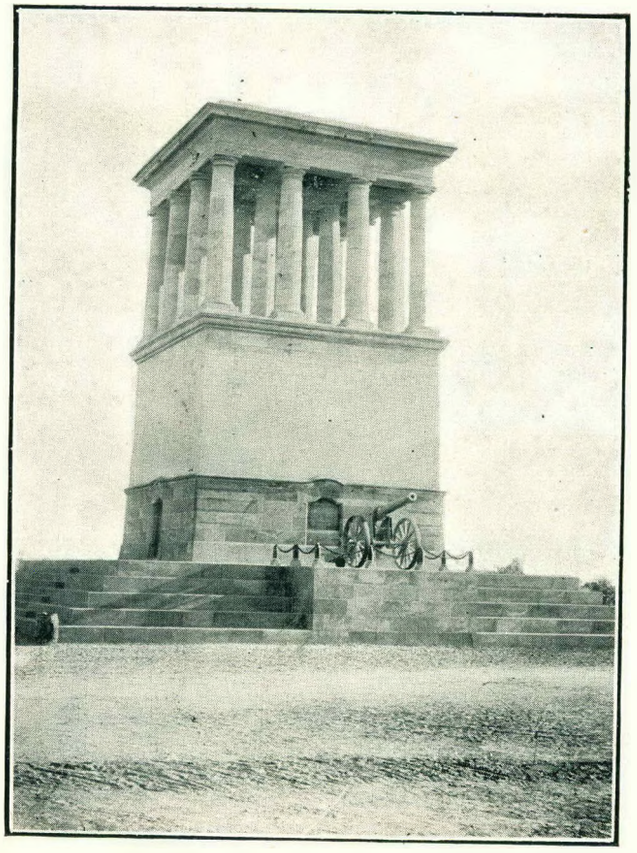
THE DICK KING MEMORIAL, DURBAN.



The Matabele War Memorial.—Bulawayo.



The Shangani Memorial at the Matoppos —Southern Rhodesia.



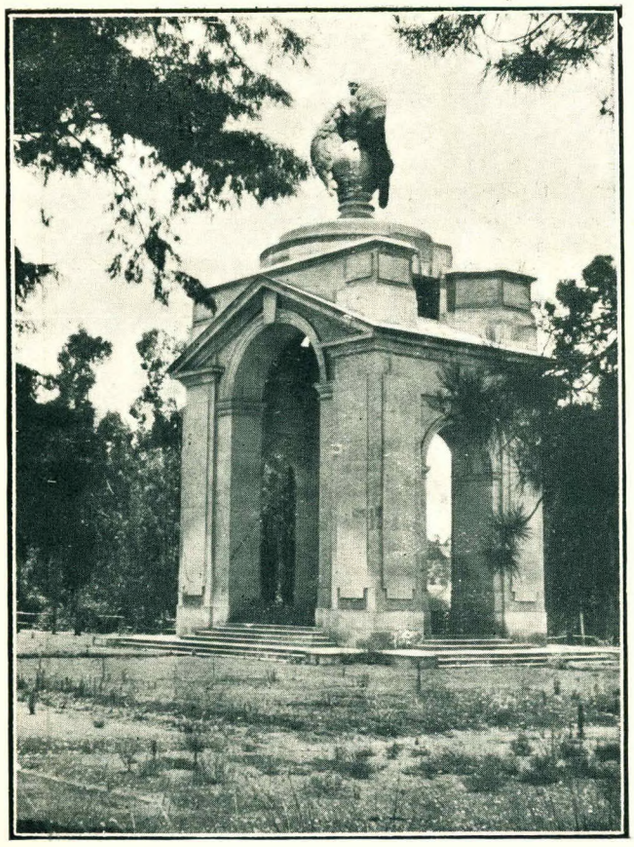
War Memorial.—Kimberley.



The Rand Regiments War Memorial.—Johannesburg.



Statue of Van Riebeek.—Cape Town.



Memorial.—Ekstein Park, Johannesburg.



Memorial.—Ekstein Park. Johannesburg.

# Students' Column.

## NOTES ON THE DESIGNING OF SIMPLE ROOFS.

The first portion of the problem in any roof design is connected with the weight of the available materials to be used in the covering over of any area.

(1.) An approximation for the weight of a well-designed iron or steel truss is:—

$$\tfrac{3}{4}\ \text{S.D.}\ (1 + \tfrac{5}{10}) = \text{W.}$$

in which formula

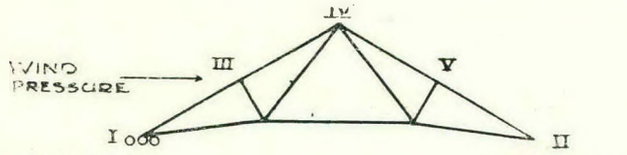
W equals The weight of the complete truss in pounds;
S equals The span expressed in feet or decimal parts of a foot;
D equals The distance (i.e., centre to centre) between the trusses expressed in feet or decimal parts of a foot.

Taking the above for the purpose of working out an example:—

Assume that the trusses are 10 feet centres.

Assume that the span is 30 feet.

Assume that the "pitch" or angle of the roof is 30 degrees with the horizon, and as per sketch below.




SKETCH No 1

The approximate of this principal is:—

$$\tfrac{3}{4} \times 30'' \times 10'' (1 + \tfrac{30}{10})$$
$$= \tfrac{3}{4} \times 30'' \times 10'' \times 4$$
$$= \tfrac{3}{4} \times 1200 = 900 \text{ lbs weight of principal.}$$

The next step is to estimate the total load required to be supported by the roof principals.

For this purpose it will be assumed that with the principals, spaced at 10 ft. centres, there will be three purlins on each side, say 2½ in. x 2½ in. x ½ in. angles: Total length, 60 ft. x 2½ in. x 2½ in. x ½ in., at 7½ lbs. per foot, equals ... ... ... ... 450 lbs.

Boarding laid on purlins, say 18 ft. on each side of principal, equals 18 x 2 x 10 ft. centres of principals, equals 360 super feet at 3 lbs. per foot, equals ... ... ... 1080 ,,

Slates laid on wood, 360 super ft. at 8 lbs. per foot, equals ... ... ... ... ... ... ... 2880 ,,

Total load on principal equals ... 4410 lbs.
Weight of principal equals ... ... ... 900 ,,
Add for occasional load (snow, etc.), say 690 ,,

Total weight ... ... ... ... ... ... ... 6000 lbs.

Referring to Sketch No. 1, the stresses at the joints I., II., III., IV., V., are as follows:—

Joint I. $\frac{6000}{8}$ equals 750 lbs.
,, II. $\frac{6000}{8}$ ,, 750 ,,
,, III. $\frac{6000}{4}$ ,, 1500 ,,
,, IV. $\frac{6000}{4}$ ,, 1500 ,,
,, V. $\frac{6000}{4}$ ,, 1500 ,,

6000 lbs.

The principals are loaded with a distributed load, consequently the reaction at the points I. and II. (see Sketch No. 1.) are also uniform and are

$\frac{6000}{2}$ equalling **3000 lbs. each.**

In the foregoing no provision has been made for wind pressure; the reaction due to this, under a condition where the end of the principal is fixed, is, at that point, parallel, the reaction is vertical to the pressure: if the end of the principal is free to move. The greatest stress always occurs where one end of the principal is fixed and the other end is free, consequently it is common to adopt these conditions for calculations, although both ends may be **nrmly fixed.**

Referring to Sketch No. 1, and assuming that the wind pressure is acting on the side with the free end, and making a choice from the following table, some results may be obtained using Prof. Karl Pearson's

formula for roofs up to 50 degrees.

$$PQ = \frac{Pv \times Q}{50} :—$$

and from 50 degrees slope and over,

P Q equals Pv

in which

Q is the angle of the roof surface with the horizon.

Pv equals Pressure on a vertical surface.

**Table of Pressures.**

| Velocity, Miles per hour | Pressure or Vertical surface per square ft. | Description. |
|---|---|---|
| 10 | 0.32 lbs. | Gentle Breeze. |
| 20 | 1.28 ,, | Light Breeze. |
| 30 | 2.88 ,, | Moderate Wind. |
| 40 | 5.12 ,, | High Wind. |
| 50 | 8.00 ,, | Gale. |
| 60 | 11.52 ,, | Storm. |
| 70 | 15.68 ,, | Heavy Storm. |
| 80 | 20.48 ,, | Violent Storm. |
| 90 | 25.92 ,, | Hurricane. |
| 100 | 32.00 ,, | Violent Hurricane. |
| 120 | 46.08 ,, | Violent Hurricane. |
| 140 | 62.72 ,, | Violent Hurricane. |

Taking the case as shown in Sketch No. 1, and assuming a wind pressure of 35 pounds per square foot and the inclination of the roof to be 30 degrees, the stress per square foot of roof area is found from Karl Pearson's formula (Pv x Q)

$$\frac{\text{35 lbs. x 30 degrees}}{50} = \frac{\text{35 lbs. x 30 degrees}}{50} \text{ equals 21 lbs.}$$

The total pressure on the principal due to wind effect only is therefore:—

18 ft. x 10 ft. x 21 lbs. equals 3780 lbs;

or taken in round figures, say 3800 lbs.

This total wind pressure only is distributed directly on the principal as follows (see Sketch No. 1):—

One Fourth or $\frac{3800}{4}$ equalling 950 lbs. on point I.

One Half or $\frac{3800}{2}$ equalling 1900 lbs. on point III.

One Fourth or $\frac{3800}{4}$ equalling 950 lbs. on point IV.

3800 lbs. tl. wind p'sure.

The reaction to wind pressure only at point I. is vertical, and it is now desired to know the direction of the reaction at the other end of the principal, point II. (Sketch No. 1.)

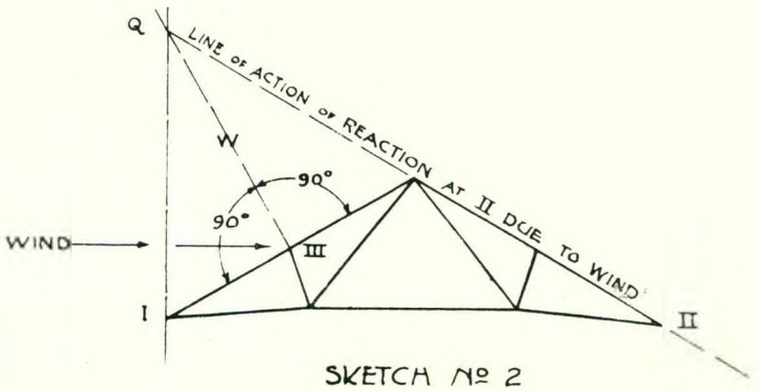
The three forces keeping the truss in equilibrium are:—

(1) The wind pressure, acting at right angles to the slope of the roof.

(2) The two reactions.

These three forces must pass though one point.

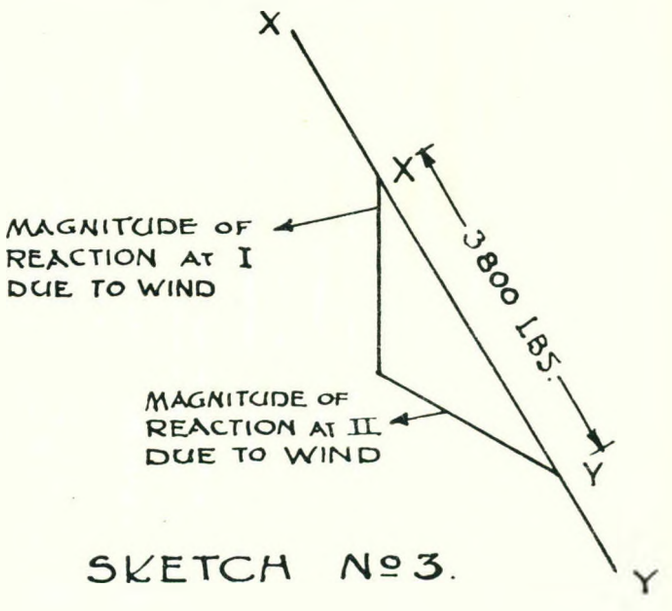
Accordingly, to ascertain the unknown line of action at II., set down a diagram of the truss (see Sketch No. 2) and indicate on it the known forces, viz., the upward vertical reaction at I. and the normal wind pressure at III. Produce these lines until they intersect at the point Q. Then, the line of action of the other reaction will be QII.




SKETCH No 2

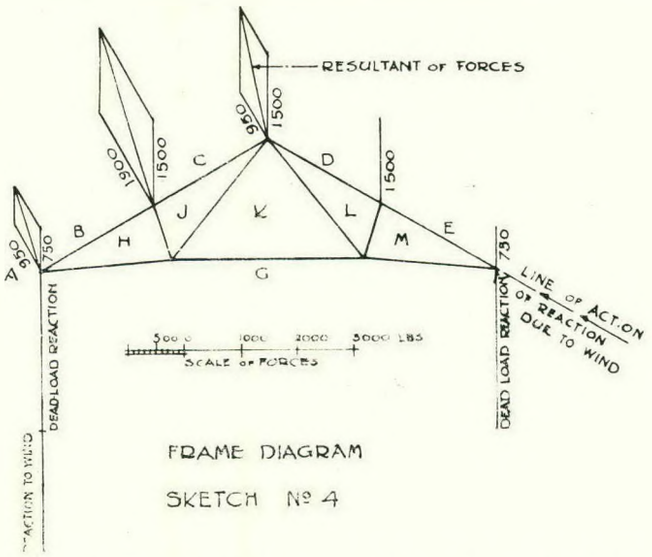
The directions of both reactions due to wind have now been ascertained, but not their magnitudes.

This is effected by setting down a line XY parallel to the wind pressure normal to the roof surface, and laying off thereon to a suitable scale a distance X'Y' representing the total wind pressure (which in this case has been found to be 3800 lbs) and resolving it into its component forces parallel to the lines of action of the two reactions. (Sketch No. 3.)

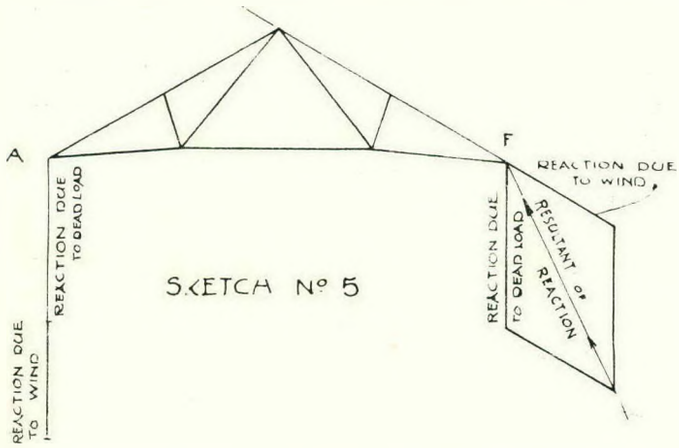



SKETCH No 3.

At this stage it will be desirable to draw a "Frame Diagram" or complete sketch of the roof principal showing upon it a general graphical representation of the direction and magnitude of all loads and reactions involved, to a suitable scale. (Sketch No. 4.)




At the point F there are two reactions, viz., those due to dead load and to wind pressure, and these must be combined in order to arrive at their total resultant.

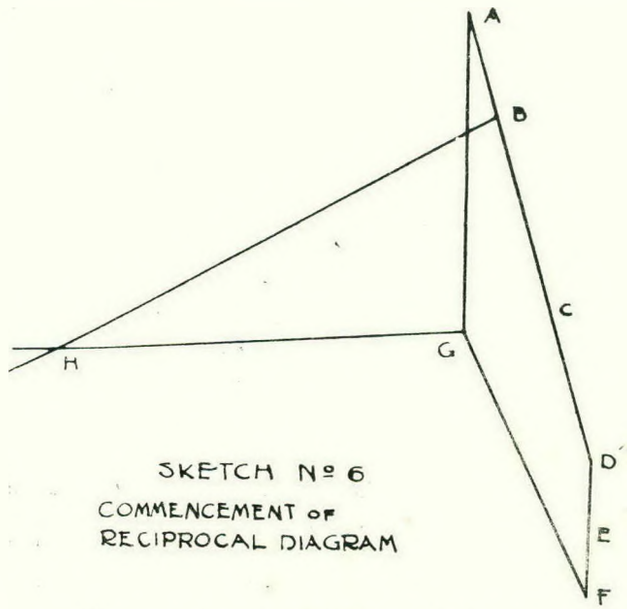



For this purpose set down to scale (Sketch No. 5) the dead load reaction and the reaction due to the wind at this point (the latter as ascertained by the method shown in Sketch No. 3), complete the parallelogram of forces and draw a diagonal line from the points of parallelogram. Then, to the same scale, the length of this diagonal line will represent the direction and magnitude of the reaction due to the two forces combined, because, by the theorem of the parallelogram of forces, "if the magnitude and direction of two forces meeting at a point be drawn to scale and a parallelogram be drawn of which these two forces form two sides, the diagonal of the parallelogram which passes through that point represents, in magnitude and direction, the resultant force."

Similarly, by the application of this theorem the resultants of the two forces acting at each of the points AB, BC and CD (Sketch 4) can be ascertained.

It will be noted that each space is lettered (in Sketch No. 4) between each calculated point, and between parts of the truss, proceeding in "clock-wise" direction. The loads, forces, or members of the truss can then be described by the letters on each side. Thus the reaction on the left side of the sketch No. 4 is called "Force G.A." This is a definite method used in all cases, and is known as "Bow's notation."

Draw to scale the necessary lines to represent the magnitude and the direction of the ascertained forces as shown in the "Frame Diagram" (Sketch No. 4) and letter the lines according to letters shown thereon. Proceed always from left to right going in the direction of the movement made by the hands of a clock. Thus, in the following sketch, No. 6, the distance AB in the "Reciprocal Diagram" is made equal in magnitude to the resultant of wind pressure and the dead load as shown on Sketch No. 4. This—the Reciprocal Diagram—is then used to obtain particulars about the other members of the truss.




Commencement of Reciprocal Diagram.

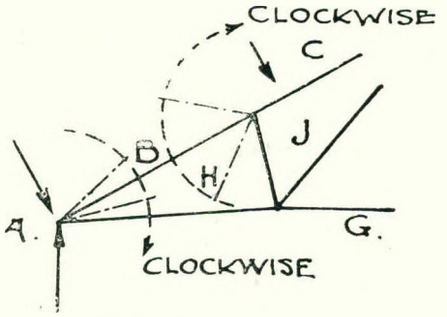
The figure A.B.C.D.E.F.G.A. representing the loads and supporting forces (reactions) forms a closed polygon, which indicates the necessary state of equilibrium between the loads and supporting forces.

In a similar manner proceed until all the members of the principal have been dealt with, beginning with the enclosing members, and then continuing with the

interior members, always choosing a point where there are not more than two unknown forces.

It will be often found that in drawing lines parallel to the members of the truss, the length of the line cannot be immediately determined, but that some other line parallel to another member of the truss must be drawn before their point of intersection determines that point which is common to both of them. For instance, at the point A in the Frame Diagram we already know A.B. and G.A. (see Reciprocal Diagram), but H.B. and G.H. are at present unknown. Therefore from B on Reciprocal Diagram draw a line parallel to H.B. on Frame Diagram: as the point H is not yet fixed the length of this line cannot for the moment be determined. Then from the point G on Reciprocal Diagram draw a line parallel to G.H. on Frame Diagram, and where these two lines intersect we have the joint H which is common to both. (See Sketch No. 7.)

To ascertain whether a member is in tension or compression, consider its action on either joint at its end. Ascertain the "name" of the member in the Frame Diagram by going round the joint in a clockwise direction, and observe in the Force or Reciprocal Diagram the direction of the force corresponding to this name. If the direction of the force is towards the joint chosen the member is in compression; if the direction of the force is away from the joint it is in tension.




SKETCH No 7.

For instance, consider the name of the member in Sketch No. 7 about the joint B.C. By going around this joint in a clockwise direction it will be seen that the names of the members meeting at this joint are C.J., J.H. and H.B.

Conversely the name of the member about the joint G.A. is, reading in a clockwise direction, B.H.

On reference to the Reciprocal Diagram it will be seen that the direction of the line H.B. (representing to scale the magnitude of the force in the member) is towards the joint B.C. on the Frame Diagram, and consequently the member is in compression. Regarding this same member as B.H. about the joint G.A., it is seen that its direction is towards the joint G.A., and consequently it is in compression.

All members should be checked towards each end in this manner.

The intensity of the stress in any member is ascertained by measuring its length in the Reciprocal Diagram to the scale adopted for representation of the forces. (See Sketch No. 4.)

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## WESTMINSTER HALL ROOF.

The Editor,
"Building."

Sir,

A statement appeared some time ago in your columns that this roof was executed or designed by to the Fund during the past year.
William, of Wykeham. As I did not think there was much justification for this, and the ascription of the work to Wykeham was new to me, I have looked up all the available authorities. Most of these are silent as to the designer, but T. G. Jackson states that Lethaby says he believes it to be the work of Master Hugh Herland, one of the King's Carpenters. On the other hand, Wheatley and Cunningham, in "London, Past and Present," state that the roof of this hall (Rufus Hall) was re-designed and built under the order of Richard II., about 1397, under the design of Henry de Yeveley, master mason. I have also seen it ascribed to Henry de Zeneley, which may be, however, a variation of De Yeveley.

It is the most grand and wonderful roof in the world, to my mind, and, apart from iron roofs, is the largest, the hall being 290 by 68 feet. It is strange to read that William Rufus, when he first saw it, complained that the hall was "too small."

My own view is that Wykeham had nothing to do with it.

I am, Yours,
E. H. WAUGH.

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## TO ARCHITECTS.

A competition is being promoted by the Witwatersrand University Committee for designs for new University Buildings at Milner Park.

Conditions etc., may be obtained from the Secretary, P.O. Box 1176, Johannesburg, on and after Thursday, 1st April, on payment of a deposit of £2 2s.

## EASIER HOMES.

### What Architects Must Learn.

The above is the title of an article in the London "Daily Mail" of December last, which contains many valuable suggestions and ideas to the architect practising in South Africa. The article is in connection with a competition, in which the "Daily Mail" offered three prizes of £250, £100, and £50 for the three best designs for labour-saving houses.

The object of the competition was to obtain plans of a house which, although it might cost more to build in the first instance, would be more economical to run than the average home designed without due regard for labour saving. In other words, a plan was sought whereby the increased initial outlay would be returned by a saving in day-to-day running expenses.

Commenting on the winning designs, appears the following:—

"There are two noteworthy points about the competitors. Nearly all are young men, who, including one prize-winner, have studied their art under the Architectural Association. It is less satisfactory that the plans, as a whole, are lacking in original ideas and that entrants have followed so closely the suggestions —which were only suggestions—that we outlined in the conditions of the competition.

"Again, in our competition for workmen's cottages earlier in the year we had 3,000 entrants—clear proof, at any rate, that architects had closely studied that class of building. For the present competition, which affects middle-class housing, less than 150 designs have been sent in. The "labour-saving" postulate was the stumbling-block.

All this shows that the whole range of convenience and economy in modern housing is almost a closed book to many architects. House-planning on labour-saving lines is apparently not as yet part of their training. It is time that it was. A manufacturer gets a factory put up, and it is exactly what a factory should be. We do not want "factory-looking" houses, but we do want architects to study convenience of appliances and arrangements in our homes; and it is towards that modest ideal that our present competition points the way."

We are not able to reproduce the prize-winning designs, but the assessor's remarks on the 1st prize design, by Mr. C. J. Kay, L.R.I.B.A., of Horsham, will give a clear indication of the points of merit in the design.

Mr. Kay, the winner of the First Prize, remarks in his foreword that he has endeavoured to evolve a scheme which shall greatly tend to reduce effort and labour without creating prejudice by making aggressively apparent the necessary drastic departures from ruling conventions.

In this he has succeeded to the following extent, according to the assessors—there is no dusting of innumerable banisters; the back door does not have to be answered every time a tradesman calls to receive orders or to deliver goods; the cleaning of fire-places is not necessary, nor do fuel and ashes have to be carried up and down stairs; the sweeping of carpets on stairs and passages is done away with.

How this is brought about may perhaps best be described by briefly referring to Mr. Kay's plan. He has chosen a type of house most generally sought after by the average family. It contains three reception rooms and the usual accommodation of a medium-sized suburban house. Where he scores is in the arrangement of his rooms, the position of the fitments, and the addition of very many small, thoughtfully contrived methods of doing away with household drudgery. In view of the proportionately heavy cost of fitments and accessories he has kept down cost of actual building to a minimum. Inexpensive material is used in so far as is possible, and the simple outline adhered to in the architecture is looked upon to contribute materially to lessening the total cost.

But it is in the labour-saving questions that we are particularly interested, and without attempting to describe the general lay-out in detail we must get on to general principles, which show where and how the various branches of housework have been considerably reduced.

To begin with, there is not a dust harbour in the house. All angles are rounded, and mouldings are practically eliminated. Surfaces of walls, floors, ceilings, doors, and windows can be readily and easily cleaned without damage to the decoration. Bright metal fittings are done away with, and heating, cooking, and washing appliances are enamelled. The floors are damp-proof, warm, silent, and restful to the feet. The windows are hung and built in steel frames in such a way that both sides may be cleaned from the inside.

Of the kitchen, where the principal labours of the day are carried on, it is hard to say enough. The various appliances are so grouped that a minimum of labour is required for the reception and disposal of stores, the preparation and service of food, and washing and house cleaning operations. Here, for instance, one finds the trades delivery hatch provided with self-locking compartments to receive packages from the butcher's boy or the baker, and slate panels on the doors on which messages and instructions to tradesmen may be written, thus precluding the necessity of running to the back door every time a delivery van calls.

The whole of the kitchen equipment is fixed on

brackets or stands on ball-bearing castors, thus facilitating the cleansing of floors. An electric range, also on castors, so that it may be moved, has adjustable legs so that it may be made higher or lower to accommodate the physical proportions of the cook. The kitchen cabinet is entirely enclosed by folding doors, or a roller shutter, and is designed to accommodate articles and provisions most frequently required in the preparation of meals. The sliding table top usually seen is omitted, on account of its liability to accumulate dirt in the slides, and a movable cooking table is suggested in its place.

The larder is fitted with removable glass shelves and a built-in food safe which is water-jacketed. Through this the whole of the cold water supply to the house circulates—quite the best scheme yet devised for a country where ice is so little used for keeping food fresh and cool. In the store, which is fitted to take dry goods and preserved food, the shelves are adjustable and made of enamelled steel.

The only coal used in the house is for one anthracite furnace, which heats the whole house and provides hot water. It is planned to put it in the back lobby, close to the coal store, so that there need be no running up and down cellar stairways to feed the furnace or to carry coals. The furnace may be used as a destructor for all house refuse also.

Radiators appear in recesses in all the rooms, but the radiators in this house are not traps for dirt, because they are hung on hinges in such a way that they may be swung out from the walls so that a person may get behind them with broom and brush.

We are indebted to Mr. Theo Schaerer for a copy of the three designs above referred to. In each case the design provides a compact, convenient and well-planned residence. The feature of "labour-saving" however appears to be more a matter of installing labour-saving fittings and appliances than one of actual planning. The elevations of the First and Third designs are quite suitable for the South African climate, while the Second Prize design is typically English.

EDITOR.

## The Association of Transvaal Architects.

*(Incorporated under the Architects' Act, No 39 of 1909).*

### QUALIFYING EXAMINATION.

An Examination, for persons of experience, to qualify for Registration as an Architect and Membership of this Association, will be held in Johannesburg on or about the 15th May next.

Applications to sit for same must be made before the 24th inst.

Full particulars may be obtained on application to the undersigned.

By Order of the Council,
M. K. CARPENTER,
REGISTRAR.

67, Exploration Building,
Johannesburg, April 7, 1920,
P.O. Box 2266. Telephone 5821.

## NOTES AND NEWS.

Mr. Ernest J. Wellman, who left some years ago to engage in war service in England, has lately returned and re-opened his practice as architect in Johannesburg. He was one of the earliest contributors to this journal.

Mr. E. H. Waugh has resigned, after ten years, the hon. secretaryship for the Transvaal of the Royal Sanitary Institute. He still remains a member of the Board of Examiners.

Mr. Harry Clayton, one of the earliest architects of the Rand, has, after a long absence of about ten years, during part of which he was on active service in France, returned to Johannesburg.

Some prominence has lately been given in the London Press to the "Boy Architect," William Francis Gibbons, a Tunbridge Wells boy, 14 years of age. A reproduction of a photograph in the "Daily Mirror" shows young Gibbons at work on a six-roomed house he has designed for his father. His mother is offering a few suggestions.

How would the A.T.A. deal with such a case in the Transvaal. The boy, not calling himself an architect, but content to be so designated by newspapers, friends and relatives.

Hearty congratulations to Mr. J. C. Kerr, who was married last month. Mr. Kerr recently returned from active service in Europe, and is one of our new members.

The Association subscribes to the following journals, which may be seen at the Association offices, Exploration Buildings, and may be borrowed during the evenings for perusal by our members: "Architectural Review," "The Builder," "Architects' Journal," "The American Architectural Review," and "The Brickbuilder" will also be available shortly.

Mr. F. L. H. Feming leaves shortly for a trip to the Old Country. We wish him "Bon Voyage," a pleasant holiday, and safe return to South Africa.

### PROGRESS.

**(By G. W. Nicolay, M.S.A.)**

In the very dawn of architecture, when the naked square blocks of clay, which practical building provided as a suitable form for housemaking, had, as has been suggested, almost by accident, assumed a more pleasing appearance; when the sharp aggressive angles had given place to a softer treatment—afterwards to be used in Europe and specially in Venice with success—and the head of the wall had acquired strength and dignity by the addition of what we call a cornice; there is nothing to surprise us if we find a highly civilised people in a country with well established government reaching to all departments and having, as we should say, building regulations, should develop refined instincts and be able to grasp even the aesthetic value of a bundle of reeds.

It is perhaps, however, rather surprising that a great constructive feature should be worked out in the reverse order, in which the builder, dissatisfied with the flat ceiling, should in shaping a circular form, perhaps reminding him of the great day star at its rising, which he regarded as an object of reverence, work out the simple vaulted roof, and from that the voussoired arch.

In the vast plains watered by the Euphrates and the Tigris, not unlike the Nile valley, though without its enclosing ranges of hills and sand deserts; with similar climate, yielding but two months in the year during which rain ever fell, and ten months of cloudless sky and scorching heat; the clay building was developed to a greater extent than in Egypt, and the decorative and protective use of plastic work, perhaps, first developed.

The desire for the concave form of ceiling once aroused, a simple process was quite easy of attainment. It was necessary to support the flat roofs in course of construction, and all that was required in addition was to make the support of a circular form. This was devised of canes tied together in frames, similar to our arch centres, with horizontal lengths from frame to frame, and then again covered with reeds. Upon this the layers of clay were each continued beyond the face of the wall, dried in succession, and in succession covered with another layer; the process being carried up course by course upon both walls simultaneously, and at last joined in the midst. The centres—to give them their modern name—unlike the Egyptian bundles were of no aesthetic value, and showed so soon as the vault was completed and dry that they were no longer necessary by shrinking away from the face of the vault. Though this was a surprise, it was, of course, welcome, and the centres were removed.

The making of clay pottery is probably the most ancient and universal domestic industry, and tiles for floors and such uses were made at a very remote period, as well as the sun-dried brick. The Assyrians burnt their bricks, and coloured and glazed the exposed faces, so that when set in the face of the wall to protect the clay, both without and within a face was obtained brilliant alike in colour and texture, and secured at the same time a very perfect shield against the weather. They, naturally, desired to treat their vaults in the same manner, and this was only delayed by the thought that the arch—concave face—if constructed in separate pieces would loose its homogeneity and would not stand; but a few experiments by way of models or small experimental buildings assured them that such work would be quite secure; no doubt to their great satisfaction. It was but another step to shape the blocks as wedges, and the arch system was complete. Nor did they stop here. These vaults were dark, and although in brilliant sunshine and with brilliant wall finish they could not have a gloomy appearance when lighted from below the springing, still it was unsatisfactory. The vault was, therefore, cut through at important points, and a semi-dome arranged by means of arches across the corners, and the front left open, so that the halls were well lighted from above, which is better than our modern method of level lighting, both for the interior effect and for the sight of the occupants.

This is interesting building, and it is remarkable that as the Egyptians continued right through the ages to present their magnificently unbroken wall surfaces externally, though they used the collonade within, so the Assyrians, no doubt pleased with their achievements, remained faithful to their arch and wall with glazed colour.

This, the most remarkable clay building ever produced, was the natural method in a country where both stone and timber were difficult to procure, a good instance of invention following necessity. The management of the clay was so well understood that the palaces and dwellings of the opulent classes were built upon great platforms made of it, which raised the buildings well above their surroundings. Stone and even marble


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were used, but chiefly in their important sculptures.

Here we have also a very early, perhaps the earliest, method of building in which the arch is constantly used; but though in Egypt the column and collonade very quickly followed the square pier of the rock-hewn excavated dwellings, it is curious that the arcade seems never to have been used by this ingenious people. The Assyrians, however, were not protected, fenced in, as it were, by mountains and deserts, and being constantly at war, empire followed empire in quick succession.

But beyond all this the arch seems to have been, for some time, regarded with suspicion on account of its complex nature. Perhaps there was an early infection of a now old superstition said to be of oriental birth generally expressed rather dreamily and with the air of much wisdom in the statement that "the arch never sleeps." That is, of course, a mischievous conception. It is just as true that the lintol never sleeps. While equilibrium remains both will stand without change. Let the rain storm at Stonehenge or the sand storm at Karnae undermine the supports, and the huge lintols sink to the ground. Or overload your beam, whether of stone, wood or steel, and if there are no abutments the posts, piers or columns will move outwards before the wreck falls. In the post and lintol the line of resistance is vertical, in the pillar and arch it is a curve depending upon the form of the arch and nature of its load. Equilibrium is obtained by a process requiring more advanced science and more interesting building. So long as the supports remain uprights, so long as the tension in the lower part of it is sufficient, the lintol "sleeps"—equilibrium is maintained. Alter these conditions, and it becomes instantly awake—violently active. We see some of the great trilogous at Stonehenge yet in the repose which has probably lasted for more than three thousand years. The collonades of the great Egyptian monuments some more, some less. Equilibrium obtained, all is well; the work well done and perfect becomes somnolent, "sleeps" until it is disturbed. The same with the arch. Similar forces are at work; superincumbent load and reaction of supports properly arranged and constructed equilibrium and stability are as sure and reliable as in the other case.

And so in course of time by the storm or by the neglect or ignorance of irreverent men—their successors—we see the mighty works of antique man lie in ruins, the great stones that bridged the intervals of their collonades prone in the mud or sand, and still some standing to witness the honest work of their builders; even so with the arch of later times. Often enough it is seen standing amid a heap of ruins, bereft of all but what is essential to its stability; walls and buttresses rent and shattered in all directions; its companions down; its office and use gone; still sleeping in the upper air among the swallows and the larks—aye, so soundly that for centuries children gather flowers beneath it, and pleasure parties select some nook at the base of its steady restful supports to enjoy their holiday feast, secure from disturbance by sharp wind or scorching sun. More than that, our modern science has found means by what we call reinforcement to supply the necessary tentional strength in a beam made of cement concrete; so that equilibrium is maintained in the mass of a lintol by means of steel ties, so that it will carry a great load over a considerable span as serenely and with more certainty than the block of natural stone.

Art and science are derived from nature, but there is more of both naturally about us than we are able to record.

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