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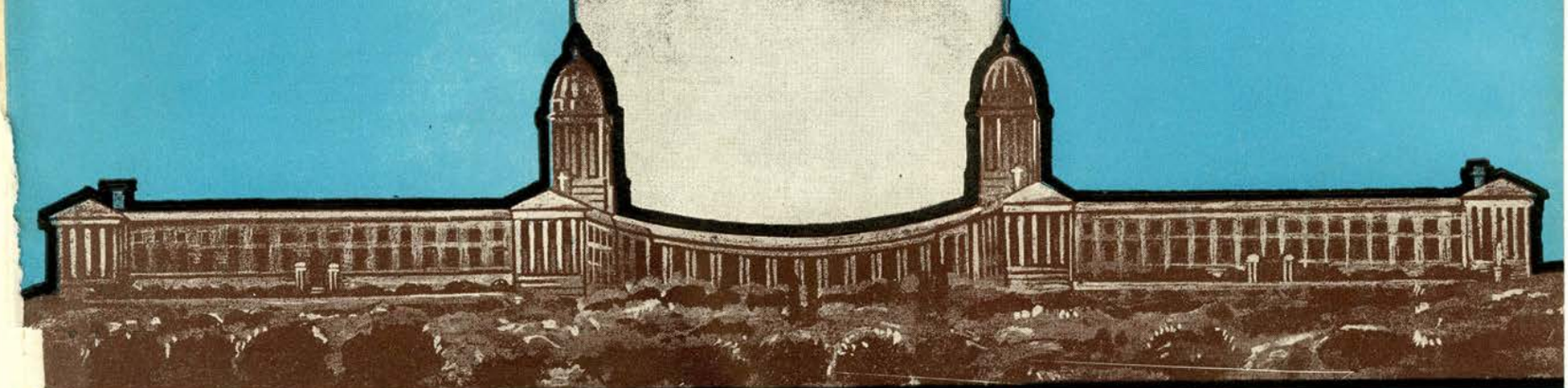
PUBLIC WORKS OF SOUTH AFRICA



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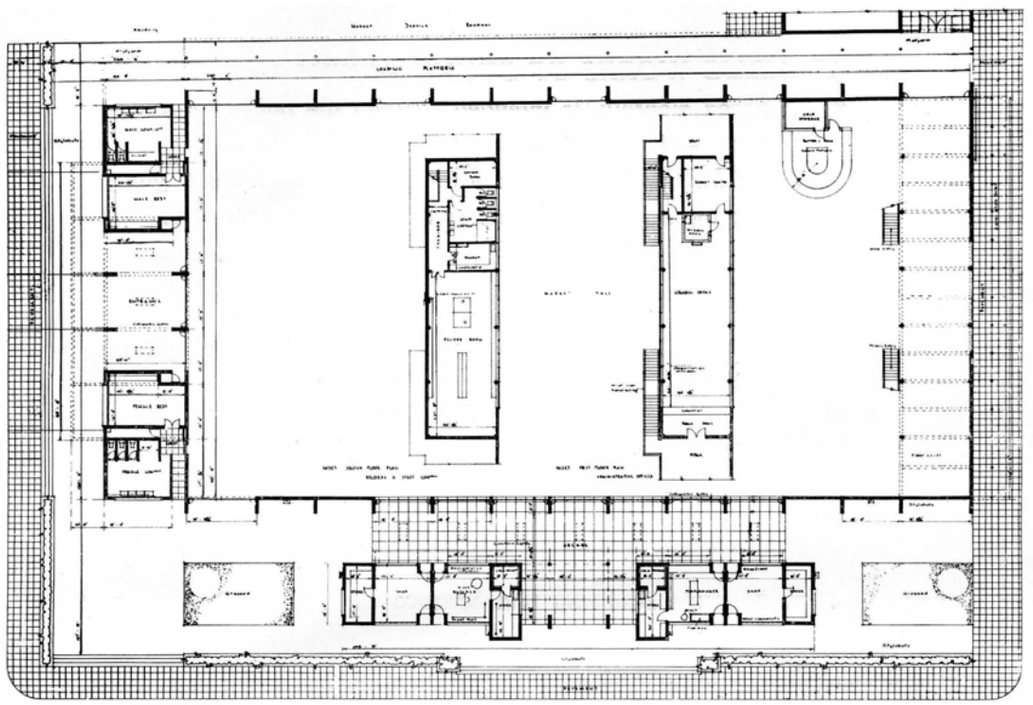
Springs Market



PLAN — with Inset showing First & Second Floors of Administration Office Block. - - -

MODERN NEW MARKET BUILDING for SPRINGS:

A Structure of Significance—Introducing New Type of Self-Supporting Roof

THE latest addition to Springs' rapidly increasing public facilities is a new Municipal market, which, if it is not the largest on the Reef, is certainly the most up-to-date from a constructional point of view. No stereotyped style has been followed in the design of this building, with the result that the Springs authorities have achieved something unusual and distinctly attractive in this field of architecture.

Its most significant feature, however, is a new type of roof construction, used for the first time in this country. It is known as the "Lamella" roof, a self-supporting structure comprising light prefabricated steel components bolted together as segments to an arc.

Constructional details of this roof will follow the description of the market building design. This procedure will enable the reader to appreciate more fully the main features of the roof.

Construction and Plan:

THE market building is erected on a raised stylobate approximately 301 ft. 6 in. by 191 ft., and occupies most of this area. The market hall constitutes the main part of the building and is expressed as such. Its internal dimensions are 240 ft. by 118 ft.

Construction is very simple. It consists of strongly buttressed concrete stanchions 12 ft. high, set at 18 ft. centres along the length of the hall. These stanchions are linked by a continuous reinforced concrete beam. There are no tie-beams whatever across the width of the hall, the only structural connection being at each end of the hall, where a semi-circular tied concrete arch, conforming to the curvature of the roof, has been introduced as an architectural finish to the roof and end façades.

The arched roof, which springs from the 12 ft. concrete stanchions, has a radius of 78 ft. This carries the apex to an approximate height of 40 ft. Wall construction between stanchions and elsewhere is carried out in face-brick.

Simplicity is the key-note of the plan, of which the main feature is that the market hall is kept free from structural or other obstructions, enabling the entire floor space to be used.

In conformity with this principle, the shops or permanent stalls are confined, in a limited number, to an adjoining arcade accommodated in an adjunct to the north side of the hall. The main entrance loggia and the rest room and convenience blocks are also accommodated in an adjunct to the east end of the hall. Although the administrative offices, requiring two floors, are accommodated within the hall, they are carried over the hall floor on circular reinforced concrete columns. This block is in reality a separate reinforced concrete-frame construction, integrated to the market hall at its western end. It is gained by twin diverging stairways situated within the hall.

Besides their function, these stairs have been treated as an architectural feature which, in conjunction with a continuous observation window to the first floor of the administrative offices and a dominating clock dial of modern design, create a focal interest when the otherwise unrelieved expanse of the emporium is viewed from the entrance loggia on the east.

Other details of the lay-out are obvious from the plan, which is reproduced here. The following points, however, are worthy of mention. The shop arcade, which has been left open at both ends, may be extended ultimately to the full length of the market building. Each shop has its display window on the arcade. This is a useful facility during inclement weather. Moreover, each shop has two opposing entrances, one leading off the arcade and one off the stylobate outside. These entrance or exit points allow through-circulation, thereby avoiding jostling among patrons. It should be noted also that the rest-room and convenience blocks may be gained either directly from the hall or through an outside entrance.

TRAFFIC FIGURES.

THE following figures may be useful if read in conjunction with the description of the design and plan of the new Springs market building.

At present the Springs market authorities handle between 200 and 300 tons of produce a week. These quantities, however, are progressively increasing, as is evidenced by the fact that the turnover for the period June-July-August this year was £3,400 in excess of that for the same period last year. In the new market building provision has been made for a weekly tonnage one-third greater than that at present handled, viz., between 300 and 400 tons.

Goods for out-of-hand sales are to be displayed on portable tables supported on trestles. Ordinary produce for auction will be stacked on the floor. Perishables, however, are to be displayed on benches 1 ft. high, 30 ft. long and 15 ft. wide.

On marketing days between 400 and 500 people are usually present at one time.

Elevations :

THE building is designed on modern lines as an integral unit, its main feature being the full free expression of the market hall, which, from single-storey height, rises expansively in a gentle arch to the apex height of 40 ft.

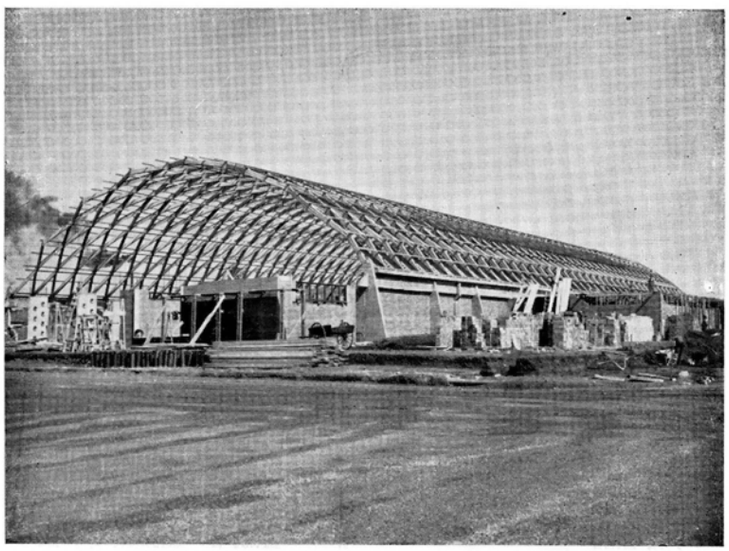
Appearance is strengthened by the "buttressing" of the north and east façades by single-storey projections or adjuncts under a flat slab concrete roof. The north adjunct accommodates the shop arcade. This adjunct has been given architectural definition by the expression of the store-rooms, which flank the entrance, in tower-like pylons rising above the single-storey elevation.

The east adjunct contains the main entrance loggia flanked by rest-room and convenience blocks. This entrance is protected by a large concrete cantilever canopy dressed in cream cullamix, the Municipal coat-of-arms being moulded on the frieze. Further definition to this elevation is obtained by large glass-brick panels on either side of the entrance, their purpose being to illuminate the male and female rest-rooms.

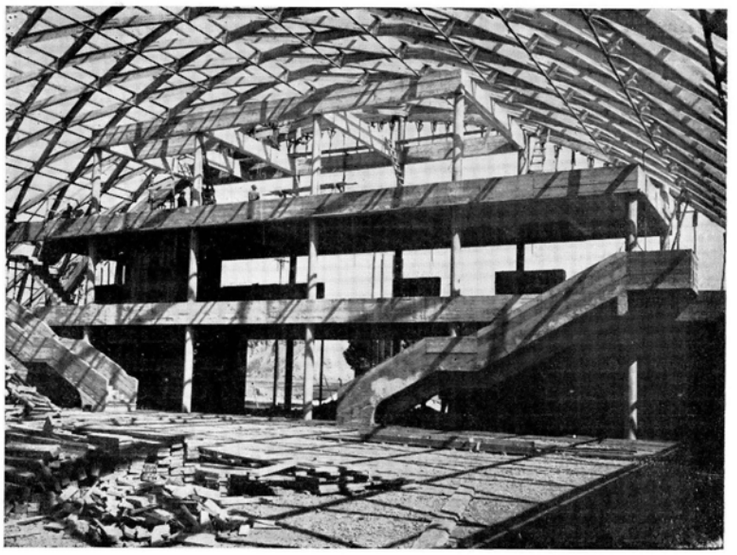
The adjuncts, together with the walls of the market hall, are carried out in golden brown face-brick above a dark face-brick plinth. Architraves to door and window openings are in cream cullamix, this dressing being repeated on the tower-like pylons flanking the north entrance, and on the parapet frieze formed by the beam linking the concrete stanchions. The buttressed stanchions add definition to the market hall walls.

As a connecting element between the east adjunct and the market hall, the internal stanchions to the loggia are carried through the slab roof to appear as deep terra cotta-faced pylons to the east façade of the hall. Against a background of cream cullamix, these pylons rise to the level of the clerestory lights which fill the top segment of the roof arch. A similar purpose is achieved by the tower-like pylons on the north adjunct. These are carried back the full width of the shop block to add an impression of height and depth.

The west elevation is essentially simple. It is defined by a continuous steel-frame window, with steel mullions, above a reinforced concrete slab canopy supported on steel columns. A subsidiary continuous window of the same design illuminates the top floor of the administrative block.



THE SPRINGS MARKET DURING CONSTRUCTION: *Note the "Lamella" roof consisting of diamond-shaped units bolted together. There are no tie-beams or intermediate supports.*



AN INTERIOR VIEW *showing the frame construction of the administration office block within the market hall. Note the twin diverging stairways which create focal interest when the otherwise unrelieved expanse of the emporium is viewed from the main entrance on the east.*

Internal Treatment :

INTERNAL treatment of the hall is on restrained lines, echoing in colour some of the materials used in general construction. The north and south walls are in golden brown face-brick with no added embellishments, as they are sufficiently relieved by the concrete stanchions and the entrance points fitted with collapsible wrought-iron gates.

The west wall, which closes off the administration offices, is faced with terra cotta coloured acoustic board in 4-ft. squares with ¼-in. spacing between the sheets. The expanse of wall is broken by the continuous observation window extended along most of its width. This window is a steel frame with steel mullions. It is glazed with ¼-plate glass, and has a 4-in. by 3-in. projecting surround. The reinforced concrete columns of the structure are carried through behind the window.

In a central position above the observation window, the wall is dominated by a clock dial of modern design. The numerals are denoted by raised discs of acoustic board, both discs and pointers being painted prussian blue. The clock movement is hidden.

The twin diverging stairways, previously described as providing focal interest to the emporium when viewed from the east entrance loggia, have terra cotta coloured balustrade walls with a prussian blue handrail. The soffit to the stairs is painted cream. The east wall is also faced with terra cotta coloured acoustic board up to the clerestory lighting.

Other finishes include a concrete floor to the market hall and shop arcade. The shops have terrazzo tile floors. Flooring in the rest-room and convenience blocks is in terra cotta tiles. The galvanized " Lamella " roof is left unpainted, and the underside of the roof covering has been sprayed with an aluminium paint.

Roof Construction :

AS indicated in the introduction, the new Springs market derives considerable significance from its roof construction, here used for the first time in South Africa.

" Lamella " roofing is a British patent, the chief structural feature of which is its ability to span considerable widths without intermediate supports, trusses or tie-rods. It comprises light, pre-fabricated components made in pressed galvanized steel to a standard design and size. Construction is effected merely by bolting the parts together to form diamond-shaped units which are both laterally and vertically rigid. The roof is entirely self-supporting, and the rigidity of its component members is such that erection is carried out in cantilever fashion without centreing. Light trestles are required only when the apex is reached.

The structural elements are essentially simple. They comprise the " Lamella " bars, which are really struts of a specialised design, top and bottom purlins and a pair of cover plates for each point of intersection. The roof covering, glazed roof lights and ventilation fixtures are attached to the top purlins.

The length and span of the Springs market roof is 240 ft. and 120 ft. respectively. The roof takes the form of a buttressed arch of approximately 78 ft. radius with an apex height of nearly 40 ft. The arch springs from the 12-ft. concrete stanchions and linking beams, outward thrust being opposed by the stanchion buttresses.

It should be mentioned that the buttressed arch is only one of the four types in which this roof may be manufactured. The other three types are as follows: (1) The segmental arch rising from the foundations which take the thrust direct; (2) the tied arch in which tie-rods are provided at eaves-level. This type is generally used where buttressed stanchions are not permissible; (3) the Gothic arch which rises from the foundations to an acute apex. Here again the thrust is taken directly by the foundations.

Illumination of the hall is achieved by a double row of glazed roof-lights at roof apex, supplemented by an additional single row half way down the arch on either side.

" Lamella " roofing is provided with a specialised type of roof light comprising wired glazing bars, 10 ft. long by 2 ft. wide, set in a continuous row: in this instance 144 ft. long. The metal astragals are also a specialised waterproof type, which do not require the use of putty, and yet permit the expansion and contraction of the glass. The weight of the Springs market-hall roof is 100 tons.

There are a number of additional advantages inherent in this type of roof which should be of interest. Its constructional features, affording uninterrupted floor space and head-room up to the utmost maximum, have already been noted. Another advantage is its transportability, and the fact that, although of a permanent nature, the roof may be dismantled easily for erection on a different site. Future extensions require only the addition of more units; and in the event of a fire in one portion of a building, only the affected members of the roof frame need be replaced. The destruction of a section does not destroy or jeopardise the whole roof.

The cardinal feature of the " Lamella " roof, however, is its ability to span considerable widths without intermediate or other support such as tie-rods, tie-beams or trusses. This feature, in conjunction with its light construction and ease of erection, makes it very economical.

The roof covering adopted for this building is also of interest. It is " Robertson's Protected Metal " corrugated sheets, each of which has been curved to the radius of the roof. The sheets are secured by means of hook bolts to the top purlins and sealed into position. This roofing is composed of an annealed steel core, coated with successive layers of refined asphalt and asphalt-impregnated asbestos felt. It possesses considerable advantages over ordinary sheet roofing, having a high heat-insulating capacity combined with great tensile strength and a permanent resistance to corrosion and weathering. Because of its covering it also has an insulating capacity against sound, and it does not require painting, a fact of great importance in a roof of this area. Another advantage of this roofing material is that the strength of the steel core, combined with the plastic nature of its covering, enable it to yield to movement set up by wind or other causes without cracking or fracture.

Site:

THE site on which the new market has been built was formerly the property of the South African Railways and Harbours. It is on the west side of the railway line immediately to the south of the present railway station. At the time it was acquired by the Springs Municipality it was swampy ground, reclaimed later by deposits of soil excavated from the recently completed subway adjacent.

Construction of the market has completely changed the site from an abandoned waste to an area occupied by a handsome building, surrounded by tar-macadamised roads and parking areas, and fronted on the east by an extensive lawn with flower-beds.

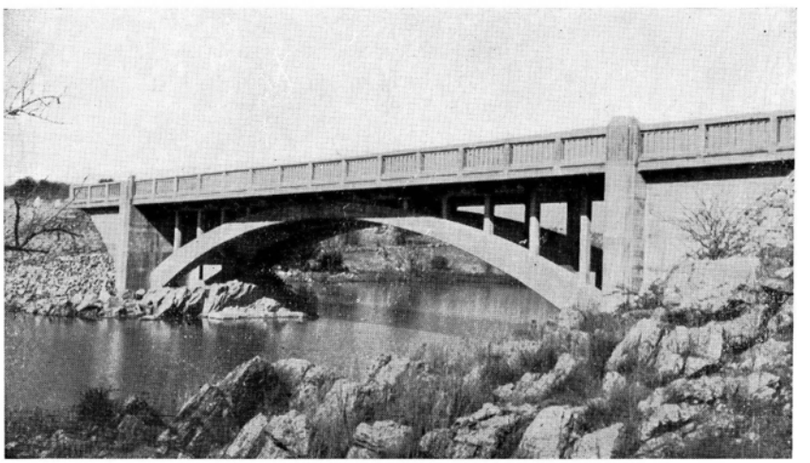
Across a road serving the loading platform on the south of the market building is the market yard with teff and poultry shed. This yard is flanked on the east by the main parking area, and on the west by the market outbuildings. The outbuildings are contained in a single unit comprising three store-rooms and accommodation for the Native staff. Access is off a concrete-floored yard enclosed by a face-brick wall.

Within this unit is another unit closed off from the rest by a wall forming an inner yard. This is the condemned-food and refuse block. Behind the outbuildings is a convenience block for Native and Asiatic males. All these buildings are carried out in face-brick to match the market building.

The new Springs market was designed and erected departmentally with the exception of the roof and supporting stanchions, the design and erection of which were carried out by Messrs. Fraser & Chalmers (S.A.), Limited. The roof covering was supplied by Messrs. G. H. Langler & Co., Ltd.

RIETSPRUIT BRIDGE

Lochvaal

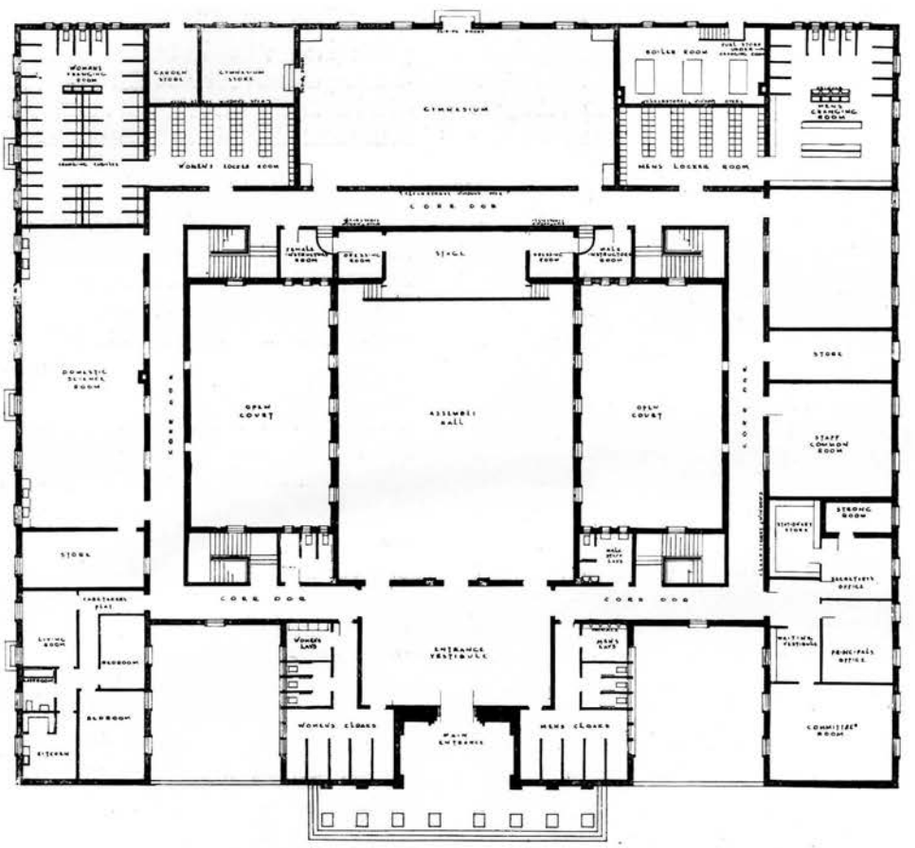


THIS ROAD BRIDGE is situated on the new National Road between Vereeniging and the Vaal River Barrage. It was designed by the Union Public Works Department, and erected by contract under the supervision of the Department.

The roadway is carried by three reinforced concrete arch ribs having a span of 112 feet The design is of interest because the superstructure is on a gradient of 1 in 30. With the completion of this bridge, a distance of six miles has been saved between Vereeniging and the Barrage.

Normal College, Potchefstroom

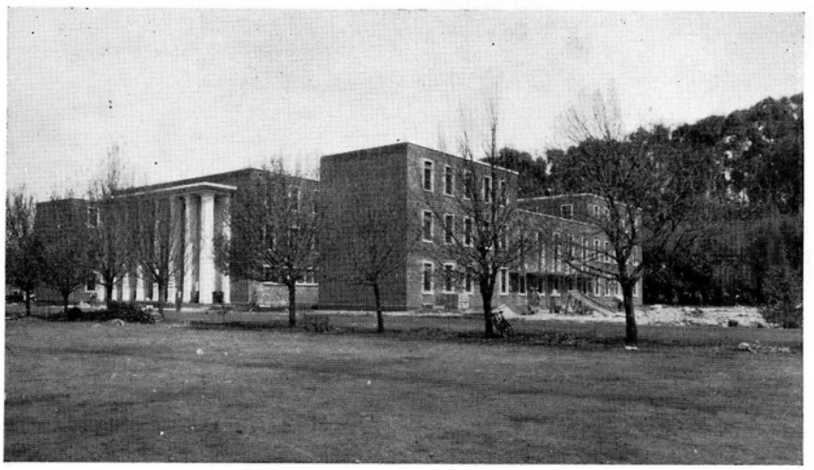
Tutorial Block



GROUND FLOOR PLAN

THE POTCHEFSTROOM NORMAL COLLEGE

New Tutorial Block and Men's Hostel



TUTORIAL BLOCK.

THE new tutorial block and men's hostel for the Potchefstroom Normal College were completed recently at a cost of approximately £70,000. They replace previous structures which have been demolished. About 400 students will be accommodated in the tutorial block, and there are 80 bedrooms in the new hostel. No new hostel has been erected for women, as the existing building was built not very long ago.

Architecturally, both buildings are of interest because of the pure, if rather severe, style adopted, the restraint in fenestration in the tutorial block being particularly notable. The architects are Messrs. Gordon Leith & Partners.

ELEVATIONS

Tutorial Block: ELEVATIONS to the tutorial block have been carried out in a severe classic style. The façades are expressed more by the proportioning and disposition of wall masses than by architectural detail or embellishment. This effect is readily noticeable on the front elevation, where the only windows facing are those at the rear of the light recesses flanking the entrance portico. The remaining areas of wall are left blank. No definition is added to this façade as a whole by the transome light over the entrance doors and the narrow continuous window at eaves-level under the portico canopy.

This severity is very effective, for the blank temple-like wing walls, carried out in light brown face-brick, throw strong emphasis on the simple massive Grecian lines of the portico with its low stylobate and its rectangular columns with simplified Corinthian capitals and plain entablature finished in cream cullamix. All façades have a plinth of semi-glazed black brick and a shallow coping of cream cullamix. Cullamix has been used also for the projecting surrounds to windows and for the architraves to doors.

* * *

Hostel Block: THIS treatment and style are repeated on the elevations to the men's hostel building, the general atmosphere, however, being less severe. An interesting variation occurs in the design of the entrance portico, which is conceived on intimate domestic lines, and is faced with cream plaster which contrasts effectively against the monotone of the face-brick background.

Fenestration is interesting, as the continuous projecting cullamix surround linking the first and second-floor windows not only adds an impression of height, but expresses the equal importance of the uppor floors in the function of the building as a whole.

FEATURES OF THE PLAN

Tutorial Block : THE plan of this block is in the form of a solid square, approximately 180 ft. wide by 155 ft. deep. It is opened in the centre by two courtyards, 28 ft. wide by 48 ft. deep, flanking the centrally placed assembly hall. In addition, light areas 26 ft. wide are recessed 32 ft. into the front elevation on either side of the entrance unit, each recess being repeated on the same axis at the rear of the building. On the ground floor these rear recesses are filled in by the boiler-room and men's locker-room on one side, and by the gymnasium and garden stores and women's locker-room on the other. These units are under a flat slab reinforced concrete roof, that of the locker-rooms being at a slightly higher level to admit illumination by means of clerestory lights.

So far as accommodation is concerned, the ground-floor plan is superficially divided into four self-contained units. There is the central unit comprising entrance portico, entrance vestibule with flanking cloak-rooms and conveniences, and the assembly hall. Flanking this central unit on the east is the administrative section, and in the west wing is the caretaker's flat. Finally, running the full width of the building at the rear is the gymnasium unit, comprising gymnasium, male and female locker-rooms and changing-rooms equipped with wash basins, showers and conveniences. This disposition of the gymnasium behind the assembly hall is particularly convenient in that the changing-rooms may be used in conjunction with the stage, if necessary.

The remaining accommodation on this floor is taken up by tutorial rooms. The entire floor is served by a corridor running around the inner perimeter.

* * *

First Floor: THE plan of the first floor repeats in outline that of the ground floor, and is given over entirely to tutorial purposes. The following accommodation and dimensional details may be of interest:—

EAST WING (front to rear):

Junior workroom 39ft. 9in. x 25ft.

Lecture room 51ft. 2in. x 25ft.

Needlework room 41ft. 1½in. x 25ft.

Each of these departments has its own store-room and study.

WEST WING (front to rear):

Women's work-room 32ft. x 25ft.

Wood and metal work-room 61ft. 1in. x 25ft. (with study, store and timber-room).

Cardboard modelling room 39ft. 9in. x 25ft.

FRONT UNIT (between light recesses):

Two class-rooms 22ft. x 27ft. 6½in., separated by two studies.

The assembly hall is carried up to the first-floor ceiling level, and has a gallery 12 ft. deep to seat 76 persons. Built into the gallery is a cinema box. The gymnasium at the rear is also carried to the full height of the first floor.

Second Floor : THE plan of the second floor is varied slightly in that, along the east and west wings, the superstructure has been recessed back to form an open terrace on each side. These two terraces are floored with quarry-tile paving, and, besides being useful features, break up the side elevations suitably. The roof of the assembly hall is at this level. The gymnasium, however, has over it a large physiological laboratory.

* * *

Internal Treatment : INTERNAL treatment in the tutorial block is simple. Outstanding features are the flooring of the entrance portico with semi-glazed black bricks, laid on edge, and the flooring of the entrance vestibule in "kairo" marble.

The entrance vestibule is illuminated by means of wall fixtures, and cove lighting concealed around a central panel 38 ft. x 48 ft. The hall has yellow strip flooring.

Oregon strip flooring has been used for the stage, which is 28 ft. 6 in. wide and 13 ft. 6 in. deep. The stage is fitted with footlights, proscenium arch lights and central suspended fixtures. Wood strip flooring has been used generally throughout, except in tutorial units, the staff common-room and store-rooms, where wood blocks have been used. Granolithic is used in the locker and changing rooms and conveniences.

* * *

Men's Hostel : THE plan of the hostel is more complicated than that of the tutorial block, although it is complementary in that the same attention has been paid to the proportioning of wall masses, so that the two buildings might harmonise in style and effect.

The hostel block faces north-east. It consists of a central unit of entrance portico accommodated in a small single-storey projection under a flat concrete slab roof, an entrance vestibule, lounge, dining-room and kitchen at the rear, all these being on the same central axis. On either side of this unit, running north-east and south-west are the bedroom wings with bathroom and convenience blocks at the rear extremity of each of the three floors. The hostel contains 80 bedrooms, each of which is 11 ft. by 9 ft. 9 in.

Although the building is three floors high, an interesting arrangement occurs through the fact that the dining-room and the common-room above it have ceiling heights of 14 ft. 6 in. and 12 ft. 6 in. respectively, carrying this part of the central unit to the full height of the building in two floors.

This arrangement has necessitated a small flight of stairs from the first floor up to the mezzanine level of the common-room floor. A false ceiling has therefore been given to the lounge on the ground floor below. The library, flanked by studies, is accommodated on the third floor of the central unit.

Side balconies have been provided to the common-room, which is only 24 ft. wide compared to the width of 34 ft. of the dining-room. These balconies are paved with quarry tiles.

Throughout the hostel the floors are wood block except on the ground floor, where wood strip flooring has been used. The dining-room has a yellow strip floor.

Book Review :

HYDRAULIC MEASUREMENTS: By Professor Herbert Addison, Fuad I. University, Giza, Egypt. (London: Chapman & Hall; 21s.).

★

PROFESSOR HERBERT ADDISON describes his book, "Hydraulic Measurements," as a manual for engineers. This description is of interest since so many books on hydraulics treat the subject purely from the theoretical standpoint and are not concerned with the practical applications.

Professor Addison has not hesitated to draw on the experience of the principal commercial firms manufacturing measuring instruments, and his bibliography includes all the latest British, American and Continental publications, scientific treatises and journals. The result is a book that combines theory with practice, and is what the author claims it to be, a manual for engineers.

In South Africa, as in Egypt, water is a precious liquid, and large sums of money have been spent in both these countries on conservation. The correct measurement of water is an important part of the economic design and distribution, and the metering of all water in South Africa is generally standard practice. The necessity for eliminating waste, as far as is possible, does not permit of a system of rating based on the number of hose connections, the size of the plot, or the number of rooms, as is still practised in some of the older countries.

The book treats of the measurements of liquids only, and does not include gases; the author shows that the study of the measurement of liquids alone is of sufficient importance to warrant a monograph of this nature.

Depth, head and pressure are first considered, and the various instruments and gauges are described, followed by the methods and systems used in transmitting readings to distant or control points. This chapter is of interest to those engineers who are responsible for the working of large power plant where control is usually centralised. The correct installation and connecting up is described in detail.

The author then describes measurement by weight, volume and velocity, introducing types of current meters and the factors affecting their design and rating. Professor Addison devotes the main portion of his book to the more important measuring instruments: the weir, the quantity meter and the differential head meters. Most metering systems are to-day based on the use of a combination of these types, and these chapters are therefore of particular use to the practising engineer.

Accuracy of Nozzles.

THE author supports the contention of many manufacturers that the accuracy of orifice and nozzle measurement is as good as ± 2 per cent., if all reasonable precautions are taken. If this is so, then the extra expenditure involved in the purchase and installation of true Venturi-type meters, which can be relied on to give accurate measurements within ± 3 per cent., seems hardly justified.

It is also of interest to note that the author's wide and comprehensive survey of measuring instruments shows that little advance has been made in solving the problem of determining high and low flows accurately on the same meter. So much of what is commonly referred to as "errors in metering" is due to large-calibre meters having been installed to meet peak demands and giving incorrect measurement at the lower flows.

The same difficulty is met with when a normally small consumer wishes to be protected against the hazard of fire, and the meter must be large enough to meet this possible demand. The use of bye-pass meters and automatic valves is both expensive and cumbersome, and does not in practice meet the difficulty efficiently.

Flow in Open Streams.

THE author includes in the latter portion of his book the measurement of flow in open streams and the discharge through gates and sluices. The use of chemicals in gauging is of interest; the aniline dye fluorescein was used in this country prior to 1907 in determining the influence and flow of underground streams and is preferred to the author's method of injecting salt and measuring the increased dionic conductivity, to which there is considerable objection.

The book is well illustrated, the diagrams clear, and the subject matter easy to read. It is a useful addition to the science of correct measurement, and is of especial value to those engineers who are responsible for the distribution of water, the measurement of sewage and storm-water discharge, and the efficient control of power stations.

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Kirkwood & Sons, Ltd., Port Elizabeth.

ELECTRIC RANGES:
Durban Falkirk Iron Co., Ltd., Durban.

ELECTRICAL ENGINEERS:
The British General Electric Co., Ltd., Johannesburg.

ENGINEERING CONTRACTORS & IMPORTERS:
Victor Kent (Natal) (Pty.), Ltd., Durban.

ENGINES (Oil and Other):
Hubert Davies & Company, Ltd., Johannesburg.
Stewarts & Lloyds of South Africa, Ltd.
W. S. Thomas & Co. (Pty.), Ltd., Johannesburg.

ELECTRIC-GENERATING PLANT:
Hubert Davies & Company, Ltd., Johannesburg.
Stewarts & Lloyds of South Africa, Ltd.

EXPLOSIVES:
African Explosives & Industries, Ltd., Johannesburg.

FIRE APPLIANCES:
Stewarts & Lloyds of South Africa, Ltd.

FLOORING:
Feder Products (Pty.), Ltd., Johannesburg.
Broudo's Saw Mills (Pty.), Ltd., Industria.
Hunt, Leuchars & Hepburn, Ltd., Johannesburg and Durban.
Mazista Slate Quarries, Ltd., Johannesburg.
Rhodesian Timbers, Limited, Johannesburg.

FURNITURE & FIXTURES:
Peach & Hatton, Ltd., Durban.
Thesen & Co., Ltd., Durban, Cape Town and Knysna.
Broudo's Saw Mills (Pty.), Ltd., Industria.

GLASS:
Herbert Evans & Co., Johannesburg.
Rhodesian Timbers, Limited, Johannesburg.

HARD BOARDS:
Hunt, Leuchars & Hepburn, Ltd., Johannesburg and Durban.
Kirkwood & Sons., Ltd., Port Elizabeth.

HYDRO-ELECTRIC PLANT:
Stewarts & Lloyds of South Africa, Ltd.

HYDRAULIC RAMS:
Stewarts & Lloyds of South Africa, Ltd.

IRONMONGERY:
Kirkwood & Sons., Ltd., Port Elizabeth.
Umgeni Iron Works (Pty.) Ltd., Durban.

JOINERS:
Broudo's Saw Mills (Pty.), Ltd., Industria.
Hunt, Leuchars & Hepburn, Ltd., Johannesburg and Durban.
Rhodesian Timbers, Limited, Johannesburg.

MACHINERY & IMPLEMENT MERCHANTS:
Seligson & Clare, Ltd., Johannesburg.
Guest, Sykes, Ltd., Johannesburg.

METAL WINDOWS:
Crittall-Hope Metal Windows (South Africa), Ltd.

OILS:
C. C. Wakefield & Co., Ltd., Johannesburg.

OIL & STEAM PURIFIERS:
Stewarts & Lloyds of South Africa, Ltd.

PAINTS:
Lewis Burger & Sons (S.A.), Ltd., Johannesburg and Durban.
Herbert Evans & Co., Johannesburg.
Hunt, Leuchars & Hepburn, Ltd., Johannesburg and Durban.

PIPES — CONCRETE:
J. Wright & Sons., Limited, Durban.
Hume Pipe Co. (S.A.), Ltd., Cape Town.

PRINTING BLOCKS:
Electric Process Engraving Co., Johannesburg.

PLYWOODS:
Furniture Enterprises (Pty.), Ltd., Johannesburg.
Plywoods, Ltd., Parow, C.P.
Raymond Plywood (Pty.), Ltd., Johannesburg.
Rhodesian Timbers, Limited, Johannesburg.

PUMPS:
Patrick Murray (Pty.), Ltd., Durban.
Guest, Sykes, Ltd., Johannesburg.
Stewarts & Lloyds of South Africa, Ltd.

REINFORCED CONCRETE:
Hunt, Leuchars & Hepburn, Ltd., Johannesburg and Durban.
A. S. Joffe, Johannesburg.
Industrial Construction Co. (Pty.), Ltd., Johannesburg.

REFRIGERATION:
Guest, Sykes, Ltd., Johannesburg.

ROAD MACHINERY:
W. S. Thomas & Co., Ltd., Johannesburg.
Guest, Sykes, Ltd., Johannesburg.

ROOFING MATERIALS:
Hunt, Leuchars & Hepburn, Ltd., Johannesburg and Durban.
John J. Kirkness, Pretoria.
Mazista Slate Quarries, Ltd., Johannesburg.
Hume Pipe Co. (S.A.), Ltd., Cape Town.
Guest, Sykes, Ltd., Johannesburg.

SAW MILLS:
Broudo's Saw Mills (Pty.), Ltd., Industria.

SHOP-FITTERS:
Fredk. Sage & Co. (S.A.), Ltd., Johannesburg.

SLATES:
Mazista Slate Quarries, Ltd., Johannesburg.

STEAM VALVES (high pressure)
Stewarts & Lloyds of South Africa, Ltd.

STEEL CEILINGS:
Herbert Evans & Co., Ltd., Johannesburg.

STRUCTURAL STEEL:
Dorman, Long (Africa), Ltd., Johannesburg.

STONE-WORKING PLANT:
Bellamy & Lambie, Johannesburg.

STONE-CRUSHING PLANT:
W. S. Thomas & Co., Ltd., Jonannesburg.

TIMBER MERCHANTS:
Hunt, Leuchars & Hepburn, Ltd., Johannesburg and Durban.
Rhodesian Timbers, Limited, Johannesburg.
Kenya Timbers, Ltd., Johannesburg.
Furniture Enterprises (Pty.), Ltd., Johannesburg.
Broudo's Saw Mills (Pty.), Ltd., Industria.

TEAK WINDOWS:
Hunt, Leuchars & Hepburn, Ltd., Johannesburg and Durban.
Broudo's Saw Mills (Pty.), Ltd., Industria.

TUBES & FITTINGS (Steel):
Stewarts & Lloyds of South Africa, Ltd.

TURBINES & PUMPS:
Stewarts & Lloyds of South Africa, Ltd.

TUBULAR STEEL POLES:
Stewarts & Lloyds of South Africa, Ltd.

TYRES:
Firestone, S.A. (Pty.), Ltd., Port Elizabeth.
India Tyre & Rubber Co. (S.A.) (Pty.), Ltd., Durban.

UNIFORM MANUFACTURERS:
H. J. Henochsberg (Pty.), Ltd., Johannesburg.

VALVE & WATER SPECIALITIES:
Stewarts & Lloyds of South Africa, Ltd.

VENTILATORS:
W. S. Thomas & Co., Ltd., Johannesburg.

WALLPAPERS:
Herbert Evans & Co., Ltd., Johannesburg.

WATERPROOFING:
Hunt, Leuchars & Hepburn, Ltd., Johannesburg and Durban.

WIRE & RAILINGS:
The "Premier" Gate, Fence & Wire Co., Ltd., Cape Town.

WOOD-FIBRE BOARDS:
Hunt, Leuchars & Hepburn, Ltd., Johannesburg and Durban.
Selinite Products (Pty.), Ltd., Rossburgh, Natal.

WOOD PRESERVATIVES:
S. Harding, Johannesburg.
B. Saphra, Johannesburg.

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