# CHAPTER V - NEW SCHOOLS

## 1. THE SITE

1.1 With the site for a new primary school, the architects both liaison and private, find that they are given a site, with no alternative, on which to build. Since the site always complies with the minimum size requirements of 3,5 hectares, the best use must be made of it with the following restrictions:

(i) The configuration and the ideal positioning of the units (Figure I) are given to the Private Architect who is instructed to maintain these relative positions as far as the site will permit, with a maximum of five degrees deviation from north orientation.

(ii) The units must be placed on the highest corner of the site for the best stormwater control.

(iii) The architect is to ascertain the existence of all services - electrical, water supply and sewerage disposal, as well as the positions of these available services.

(iv) When the sketch designs have been approved, the TWD Structural Engineer is to be advised without delay so that the necesary soil investigations can be done which influence the structural design.

1.2 Very often a new primary school is built in a new township and, on occasions, in a township that is not yet fully or even one which is sparsely built up. Despite the fact that the site has been handed over to the architect he is still expected to check that there are no problems such as unproclamation, unusual servitudes, or any other restriction not apparent. Of this he is not always made aware.

## 2. THE SCHEDULE OF ACCOMMODATION

2.1 Before the schedule of accommodation can be discussed, it is necessary to understand the basis of the reasoning behind the compilation of these schedules.

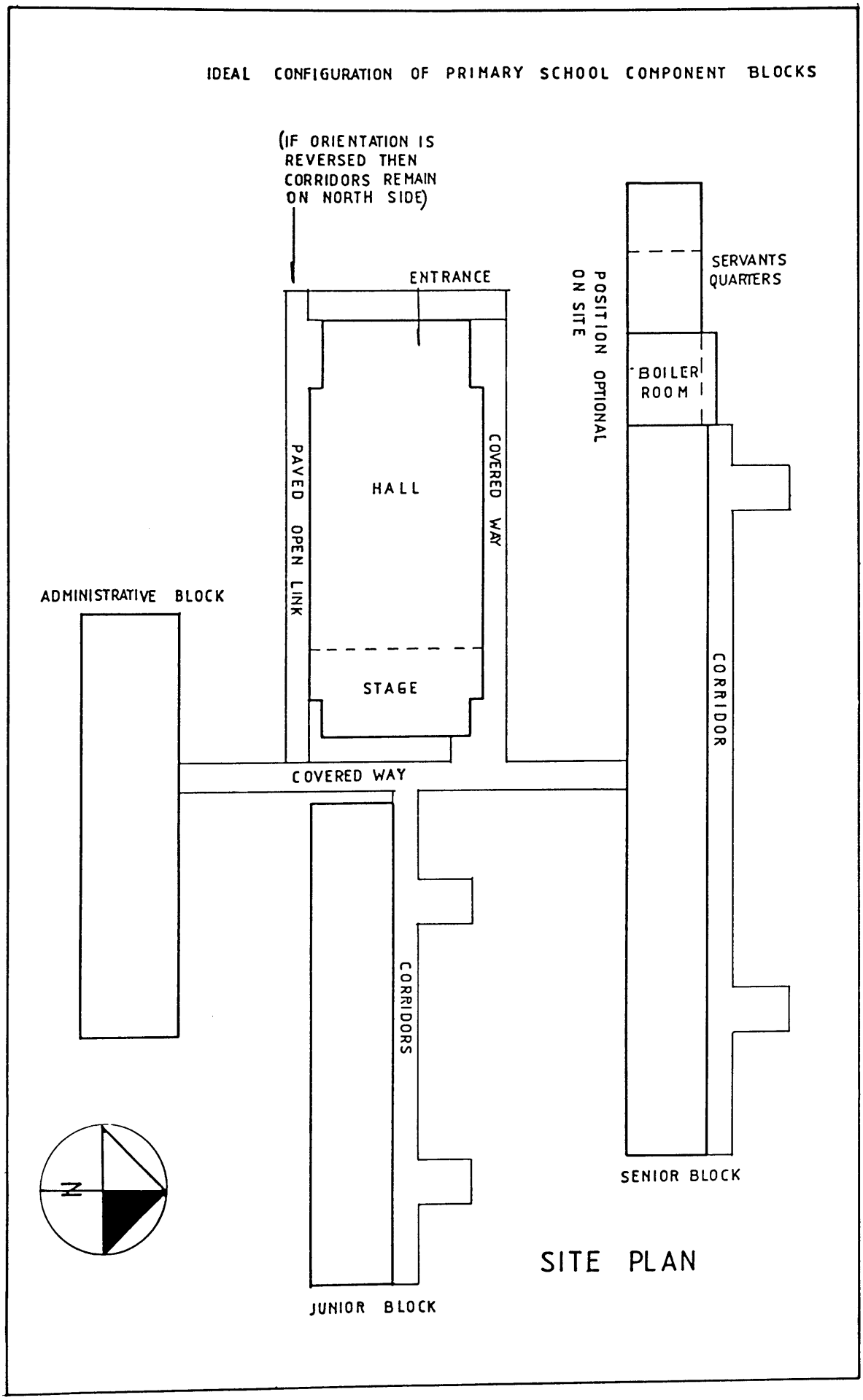


FIGURE I - IDEAL CONFIGURATION OF PRIMARY SCHOOL COMPONENT BLOCKS

2.1.1 The unit of measurement used to express the size of any school is the pupil, thus a school is referred to as an "X"-unit school, expressed in a determined number. Each and every unit element in this school both in size and number of similar units will relate in direct proportion to the "size" (expressed in numbers of pupils) of the school.

2.1.2 The size of a normal primary school in the Transvaal has been determined by the TED as 750 units regardless of its geographic location in the Transvaal or its situation in a town or city. All primary schools, therefore, are initially designed as 750 unit schools for the master plan, are built according to the demographic requirements of the particular area at that particular point in time, always with the intention of completing the school building as a 750 school.

2.1.3 The initial size of a primary school in the Transvaal depends on the statistics supplied by the regional offices of the TED, which office has as one of its duties, the task of continually checking the growth-points in its areas as well as projecting the apparent rate of growth with a view to establishing: (a) the need for a new school; (b) the initial size of the new school; (c) the language medium of the intended new school, or (d) the required additions of a permanent nature to an existing school not yet fully expanded to the maximum 750.

2.1.4 Temporary accommodation is provided by means of prefabricated classrooms at a fully developed 750 school to cater for the overflow in that area until relief can be provided by way of a new school building elsewhere in the area.

2.1.5 The smallest school building that will be considered for building initially today is for 300 pupils although the majority of the undersized primary schools considered today are for 500 pupils. This has been proved to be the most practical viable size always with the intention of expanding, when circumstances demand, to the full 750 school.

2.1.6 The method employed to assess the need for, the sizes of, and the total number of the various elements required, has been based on

the optimum number of children that can be most successfully handled by a single teacher coupled with the optimum number of school teachers that can be successfully controlled by a single school principal, and the minimum clerical and professional staff required by the principal to efficiently manage this school.

2.1.7 The various elements required to make up a primary school for 750 pupils in the Transvaal has been carefully assessed and decided upon by the TED with the assistance of the Council for Scientific and Industrial Research aided by the architectural section of the TWD, with the scaling down required relative to the reduced number of pupils in the instances when the initial building is for less than 750.

2.1.8 The optimum number of children in a class for primary school children has been found to be 30 with an accepted increase to 35 before there is any significant decline in the standard of learning for that particular class.

2.1.9 The number of class-rooms required for a 750 school is 25. For reasons not affecting this study it has been found that it is necessary to divide a school into junior primary, consisting of Grades I and II and Standard I and senior primary, consisting of Standards II to V.

2.1.10 The grades children by virtue of their ab initio education require special teaching elements which are referred to as "grades-rooms". These are distinct from and larger than class-rooms and include the addition of a small store for special equipment. It has been determined that there are eight grades-rooms and seventeen classrooms required for a 750 school.

2.1.11 Apart from ordinary teaching elements the teaching syllabus in the Transvaal requires the provision of (a) a basic techniques classroom; (b) a junior science laboratory, and (c) a media centre which includes the library function.

2.1.12 A community hall primarily provided for assemblies with all the children standing, and designed with a reasonable stage, to function as an entertainment hall for small concerts, prizegiving functions and other primary school social functions.

2.1.13 From the days of the "one-man school" the need for effective provision of accommodation for the administrative personnel and a comfortable staff common-room to accommodate the thirty to forty members of the entire personnel has long since been recognised resulting in a separate administrative block being provided.

2.1.14 The final schedule of accommodation carefully and accurately describes the exact sizes and numbers of elements permitted in the complete primary school complex and may not be deviated from. To permit efficient administration of the school functions, the entire primary school is required to be physically divided into five distinct building units, namely:

(i) The administrative block
(ii) The junior block (grades)
(iii) The senior block (standards)
(iv) The hall
(v) The services, which include the boiler room (for central heating in areas where this is provided) the labourers, male and female, wash, dining and changerooms, and the storerooms for garden equipment.

2.1.15 Design and provision of the playing fields does not form part of the building contract. These are provided for under a separate contract and it is the exception rather than the rule that the playing fields are provided simultaneously with the building because the provision of classrooms is always considered to be the top priority. In spite of this, the architect is given the standard sizes of the various sportsfields to be catered for and it is his task to supply a design layout of the sportsfields to ensure that they can be provided for on the remaining portion of the 3,5 hectares after the school buildings have been erected.

2.1.16 The rigid requirements, restrictions and limitations laid down by the schedule of accommodation invited standardisation and has resulted in the standard design of a primary school in the Transvaal.

## 3. THE STANDARD PLANS

3.1 In the case of new primary schools in the Transvaal the TED has accepted the detailed design of each of the five unit blocks that comprise the complete primary school complex for 750 pupils and the Executive Committee (Exco) of the TPA has also accepted these five units for the standard primary school in the Transvaal by virtue of the Exco Resolution No. 744 dated 26.5.1980. It can only be altered, deviated from or amended by way of an official Exco resolution.

3.2 The prescribed layout and related positions of the individual blocks are conveyed to the Private Architect by way of a diagram illustrating a hypothetical case (Fig. I).

3.3 The previous standard plans became outdated and difficult to adopt for various reasons and is best explained by a report prepared in 1980 by the author, in an endeavour to explain the reasoning behind the latest standard primary school design.[1]

## 4. REVIEW OF THE VALIDITY AND EFFECTIVENESS OF THE CURRENT STANDARDISED PRIMARY SCHOOL BUILDINGS

4.1 A brief description of the methods employed and the results obtained during the process of a revision and up-dating of the outdated Standard Primary School design.

4.2 The purpose of the exercise was to examine the current primary school drawings which, since 1971, had served a very good purpose with a view to updating the documentation as well as bringing the costs down to an acceptable minimum.

4.3 After some considerable research, it appeared that the approach would be to divide the entire problem into three sub-problems.

4.3.1 Firstly, that the technological advances resulting in a revised methodology, and the changes in the TED requirements had resulted in an initial issue of at least sixty common variation orders.

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[1] CANDIOTES, G., "Standard Primary School", Report presented on request of the Transvaal Education Department and instructed thereto by Mr M.K. Anderson - Chief Architect of the Transvaal Works Department, 1980.

4.3.2 Secondly, various regions were solving various similar problems in different ways, as well as creating other problems of their own.

4.3.3 There did not appear to be a sufficiently strict control over the final costs.

4.4 Having established and isolated the sub-problems it was then decided to direct the exercise so as to uncover anomalies, if any, and then to eliminate redundancies, all with a view to establishing a recognised and acceptable standard throughout the whole of the Transvaal. To do this, the hypotheses were formulated and the investigation revolved around these hypotheses.

4.4.1 The first hypothesis was that the various teaching areas could be reduced with a view to decreasing the total floor area of the primary school.

4.4.2 The second hypothesis was that each region had its own idiosyncrasies and aided by the necessity for variation orders as dictated by changing circumstances over the years, were, in fact, also introducing their own innovations. This was all carried out by each region on a unilateral basis.

4.4.3 The third hypothesis was that the total costs of a primary school could be effectively reduced by the judicial reduction in size, of the various teaching elements (areas) and circulation space after a thorough investigation of the prevailing facts.

4.5 The process of obtaining the data was done by following a research methodology consisting of the classification of data into three separate categories.

4.5.1 From published reports on instruction media and construction methods.

4.5.2 From responses to question put to inspectors in our regional offices.

4.5.3 From responses to questions put to selected primary school headmasters as well as to subject specialist educationist employed by TED head office.

4.6 The classification of the data and subsequent processing as applied to the design refinements produced a most satisfying and totally acceptable new standard primary school.

4.6.1 Final acceptance of a 3,6 metre module resulted in the most economical grid which was applied to every unit block in the complex. This module of 3,6 metres permitted the subdivision of each unit into acceptably proportioned elements.

4.6.2 The module permitted an acceptable and structurally economical breakdown of the various units to easily build, where necessary, a predetermined fraction of the complete 750 school. The predetermined fraction built could then, at a later stage, or in various stages, be expanded to the full 750 school.

4.6.3 The module also resulted in a desired reduction of total school area of 18% with an obvious resultant cost saving.

4.6.4 The Director of Works issued instructions to have the TPA drawing office prepare a completely new set of working drawings treating each unit block as a separate entity so that entire units where singularly needed, could be provided on a standard basis. The entire set of drawings (over 60 sheets) were each drawn on an A1 sheet, with all the notes and notations typed with a special typewriter.

4.6.5 Transparencies of the new set of drawings can be successfully adapted to any site by any architect in a most professional presentation.

4.7 The new standard primary school fulfils all the educationists' expectations, is aesthetically pleasing and is most acceptable to both teachers and pupils.

5. USE OF STANDARDISATION

5.1 The motivation behind the design and use of the standard plans for a primary school in the Transvaal is fully dealt with in the report. The TPA introduced standardisation for the following reasons:

5.1.1 The desire to save professional fees by the use of standard plans and their adaptation was never a consideration in the factors that prompted the design of a standard plan.

5.1.2 The rigid restrictions and limitations imposed by the accommodation schedules of a primary school and the interrelationship of the elements convinced the authorities that since the rate of growth of the school-going population requires approximately ten new primary schools per year, it is unwise to expect ten different architect firms annually to, independently, carry out the research necessary to design a primary school, or to commission one firm of private architects to execute the design, documentation and erection of all the primary schools or even to alternate them annually.

5.1.3 The actual research and design of a primary school was best placed in the care of architects with practical knowledge and experience in the functions and problems attendant upon the administration of a primary school. It was, therefore delegated to the architects employed by the TPA to produce an efficient and functional design for a primary school that would comply with the rigid requirements of the TED. This was done in the best interest of primary school education with absolute regard for the requirements of the pupil and teacher within the permissible budget.

5.1.4 The only real variable in the design of the various primary schools situated in different locations was the restrictions imposed by the site and whether or not the climatic conditions would dictate the necessity for central, or any other form of heating. Thus with only one real substantial variable that could only affect the orientation and inter-relationship of the various standard unit blocks it appeared to be the epitome of logic to employ the use of standard plans which could be updated as and when dictated in the technological advances and resultant changing systems.

5.1.5 The need for standardised efficiency without the total loss of aesthetic appeal is far better than mediocre design for the sake of over-emphasis on the aesthetic. Why then should the TPA be permitted to enforce standardisation for the sake of efficiency ?

5.1.6 The Russian launching of Sputnik I in 1957 provided a new impetus to constructive public concern for education, resulting in more acceptance of major changes in educational policy and decision-making

at the local, provincial and national levels.

5.1.7 It is more important to erect primary schools of a proven design than to experiment with designs by various private architects not all having the same knowledge of educational requirements. This is best summed up by Cameron (1965, p 7) who stated:

> "Technological and scientific advances during the past several decades have resulted in an increasing emphasis on improving the quality of education. The American people are awakening to the fact of quality education and it is especially so in small schools with few pupils. It is also generally being recognised that safe, comfortable, healthful, attractive and well-equipped school facilities play an important role in a modern education programme".

6. ADAPTATION OF STANDARD PLANS

6.1 After acceptance and approval of the layout of the new school the architect is advised of the approval with the required amendments, if any. (See Appendix D2). The architect is again advised as to who the Liaison Architect will be and is asked to contact him without delay with a view towards setting the date on which they are to meet for the necessary briefing.

6.2 Transparencies of the original 1:100 drawings with the attendant detail drawings of the five different unit blocks, comprising some sixty-four drawings, are handed over to the private architect during the course of the briefing.

6.3 The Private Architect is advised to submit four copies of the detailed site plan as soon as possible to the Structural Engineer so that arrangements can be made for strategic trial holes to be sunk to determine the nature of the footings and foundations required.

6.4 The adaptation of the transparencies of the standard drawings require the following actions to be taken by the Private Architect.

(i) Checking all the prints issued to ensure that the sets are complete, legible and suitable for reproduction;

(ii) preparing the site plan in accordance with the approved configuration for the specific service;

(iii) describing the type or types of facebricks to be used for the specific school;

(iv) inserting the correct foundation walling for the specific site;

(v) completing all the sections and elevations by introducing all the relative natural ground lines as determined by the specific siting and the subsequent relative finished floor levels of the various unit blocks;

(vi) detailing the specific covered ways required for the specific site layout.

(vii) completing the hot and cold water supply reticulation;

(viii) completing the entire drainage and stormwater layout for the specific site;

(ix) furnishing detailed site plan showing all the relative "site works" for the specific site;

(x) completing all the drawings with the correct titles, headings, sub-headings, drawing numbers and all other required information, and

(xi) continuously attending to the co-ordination of the documentation by all the other attendant disciplines.

6.5 At the working drawing briefing all these instructions are verbally conveyed to the private architect by the Liaison Architect since a standard "procedure manual" does not exist.

7. CO-ORDINATION OF CONSULTANTS

7.1 The co-ordination of the various consultants is potentially a weak link because the procedure varies with respect to the consultants being either private or departmental. If the consultants are handled departmentally, which invariably is the case with Mechanical Electrical and Structural Engineering, the Private Architect is inclined:

(a) to accept that the specific consultant requires no direction from him since the drawings are standard, or

(b) the responsible official will contact him or supply him with their completed documents, or

(c) approach him (as in private practice) from time to time, if the period of silence seems too long, or

(d) the professional consultants will, in any case, do as they are instructed by the TPA departmental heads since the primary school is of a standard design and they are reluctant to oppose bureaucracy. In fact, rather than being the team leader, the Private Architect is not made to feel secure in his supposed position of authority.

7.2 The TPA officials handling one or more of the consultancies, on the other hand, all express the view that the Private Architect is paid for co-ordination and must therefore, regardless of bureaucratic opposition initiate and follow through all the involvements of the professional disciplines serving in his specific team as well as cope with the non-standardised procedures of the individual TPA works sub-departments.

8. THE COMMISSION

8.1 The standard form of appointment makes no distinction between an addition or alteration to an existing school, where the nature and layout of the school will determine the design and documentation (very much the same as in the private sector), or a new school, (where standard design is compulsory) and the adaptation of standard drawings will affect the fees structure. At present in the case of adaptation of standard drawings the time-scale applies. This fact is usually only made clear to the Private Architect at the first handing over of the site provided the Liaison Architect remembers to do so. There are cases on record where the Private Architect was not so advised and even needed to institute changes in the initial sketch design only to be told later that this was not permitted, resulting in a re-design with unnecessary waste of time.

8.2 The fact that supervision may possibly be omitted from the Private Architect's services is not clearly stated in the initial letter of appointment. Only when the architect receives the letter advising him of the successful tenderer (Appendix D1), is he advised whether or not he is to undertake the supervision of the contract. This does not always come as a complete surprise because invariably the architects enquire about the possibility of supervision of the contract at an early stage.

# CHAPTER V1 - ADDITIONS TO EXISTING SCHOOLS

## 1. THE SITE

1.1 With regard to alterations and additions, the site is obviously determined by the specific existing school building involved, and can be in any town or city in the Transvaal; the alterations and/or additions can be motivated by either the need for expansion or the need for up-dating (modernisation).

1.1.1 Prior to World War II the building of schools did not allow for possible expansion or modernisation so in these cases the planning is difficult and costly.

1.1.2 After World War II the school buildings were designed and built with a definite view to expansion and updating, except for the administrative section, so that this invariably resulted in the building of a new administrative block with attendant problems of re-allocation of the areas provided for office accommodation into teaching areas.

## 2. THE SCHEDULE OF ACCOMODATION

2.1 Alterations and/or additions to an existing school are only considered under the following headings:

(i) expansion
(ii) up-dating
(iii) restoration
(iv) change of function, and
(v) temporary relief for overflow

2.2 Expansion is considered necessary by means of permanent conventional construction when the enrolment at an undersized school for less than 750 pupils has increased to the extent that one or more classrooms or teaching elements are required to replace the temporary structures that have already been provided, to cater for a projected unusual growth, or when there is a change of educational policy dictating an increase of teaching elements brought about by the reduction of pupils per class unit.

3. LETTERS OF APPOINTMENT

3.1 In the case of expansion the letter of appointment to the Private Architect will read either - (a) specifying the exact number and types of elements to be added or altered, or (b) stating merely "Build out to 750" or to whatever number may be required up to 750, but has never read build out from X to Y. Clarity here would help the Private Architect greatly in assessing the size of the project before replying to the letter of appointment and afterwards discovering that the service is of such a nature that he may not be able to handle it to the satisfaction of the TPA at that point in time.

3.2 Updating (modernisation) is usually coupled with some form of expansion or addition and is considered necessary when the outdated school building ceases to cope with either - (a) the number of pupils in total or per class unit, or (b) the effective administration of the school functions. By the very nature of the necessity to update, it is always postponed until it is coupled with substantial additions and/or alterations to the permanent structures of the school buildings.

3.2.1 The letter of appointment to the Private Architect has usually described this service as follows: "Provide new administrative accommodation and 'x' elements (briefly described)" or "Build out to 750"; this will include the standardisation of all the existing units in the school building to bring the school up to the present-day accepted standard. Whatever description is given to the service, the Private Architect has no idea as to the extent of the service until he is briefed at the first site meeting. More often than not the Liaison Architect finds himself in the same position.

3.3 Restoration of a school building becomes necessary when it (a) is totally or partially destroyed by fire, (b) has suffered hail, rain or other damage caused by "force majeure", (c) partially or totally destroyed by earth subsidence or movement, or (d) any other cause resulting in some form of destruction or ageing to such an extent that the buildings must be restored to a state of effective function.

3.3.1 The letter of appointment to the Private Architect will describe the nature of the service without indicating the exact extent of the service. Once again and especially if the school building is far distant from Pretoria, both the Private Architect and the Liaison Architect will discover the exact extent of the service for the first time at the first site mecting.

3.4 Change of function of a school building very rarely occurs and then only when a particular school building or acquired quasi-suitable building is required to revert to the function of a primary school building. For instance, the reversion of a group II school (Grades to Standard VIII) to a primary school (Grades to Standard V) or an acquired private school to a Provincial Administration primary school or any other form of conversion where an existing building must be altered or restored to new for the first time, function as a primary school.

3.4.1 The letter of appointment to the Private Architect will merely give the locality, name the existing building and state that it is to be altered to a primary school for "x" pupils and once again, but this time, unavoidably so, the extent of the service will only become evident at the final site meeting to all the parties concerned with the implementation of the required service.

3.5 Temporary relief for overflow is always provided for by means of prefabricated structures (to be re-used at a later date) and is considered necessary when (a) the pupil enrolment exceeds 750, in the case of a full-sized school, and a new school is either not yet warranted or where there are insufficient funds or there is no suitable site, or (b) an undersized school has an excessive pupil enrolment and there are insufficient funds or a shortage of time to provide the necessary additional accommodation.

3.5.1 The letter of appointment to the Private Architect will clearly define both the nature and extent of the service required.

4. THE STANDARD PLANS

4.1 Even in the case of alterations and/or additions the Private Architect will, at the first site meeting, be given prints of the drawings or the latest accepted standard units for a primary school which he is instructed to use (a) as a guide towards the size and

internal details of a unit, be it a classroom or any other standard element; (b) as a guide to possible future requirements if, in spite of the required service, the school building will still be undersize, or (c) the complete adaptation of the transparencies when the additions are of such a nature as to warrant a complete unit block. This is only advisable when the aesthetics of the standard unit is congruent with the aesthetics of the existing school. If the aesthetics are not congruent or complimentary then the standard drawings must only be used as a guide with regard to the accommodation requirements.

4.2 As an aid to the Private Architect, the prints of the standard plans are particularly useful because private architects are not school specialists with a knowledge of the accepted norms of the various elements and units in the building of a primary school. By the very act, therefore, of supplying the private architects with the standard drawings as a guide, and issuing instructions for the strict adherence to the internal details, the TPA are assured of the provision of accepted standards eliminating all possibilities of a comeback.

4.3 Where a completely new block to be built is made possible with the adaptation of transparencies of the standard drawings, this is insisted upon in the interests of proved effectiveness in the function of the service provided and never resorted to as a means of reducing the architect's fees. Since the line of discernment between congruency with the existing building is determined by the Liaison Architect, the resultant insistence on the use of a standard building, by the Liaison Architect, as acceptable aesthetically, because of the Liaison Architect's acquired perception, often is the cause of dissatisfaction by the Private Architect and results in a subsequent dampening of his initiative, by virtue of his inherent creative instinct.

4.4 In favour of the use of standard plans and details, developed since the last World War, mention must be made of the American, William Caudill (1954, pp 16-17), who stated that:

> "Historians might say that 1950 brought a new light to educational architecture - a new movement based on the needs of the pupil (whether or not 1950 goes down in the history books as a turning point toward improvement

of school buildings, it can certainly be said that 1950 represents a year in history when for the first time a large majority of architects and educators throughout the entire nation got together to try to solve their common problems. Many conferences were held where the average architect and the average educator participated; consequently the average school building began to approach the quality of more advanced prototypes ...

... within the new crop of young architects and educators there are many who have caught the pupil theme idea with aims to perfect it. Today architects and educators everywhere are beginning to see the value of working together, jointly, to plan schools based on the need of the pupil. Finally we are beginning to break the bonds of preconceived spaces and shapes".

4.5 Opposed to the use of standard plans, quite a few architects, in response to the Questionnaire, voiced the opinion that it should be their prerogative to experience the same traumas as the TPA school architects in proceeding through the full gambit of research to arrive at either the same solutions or possible better solutions. Invariably though they were content to accept that all standards were not haphazardly arrived at and did indeed have merit. But this opinion was only shared after careful explanation of the steps involved in arriving at the various solutions.

5. THE COMMISSION

5.1 The standard form of appointment (Appendix B1) omits to convey to the Private Architect the extent of the service, the restrictions with regard to the conformity to the standard design and the possible fragmentation of the architect's services.

6. SUMMARY

6.1 The object and purpose of the study in this chapter was to endeavour to bring out the difference in the approach to and the handling of the service when applied to a new school building as distinct from that of additions and/or alterations to an existing building. The conclusion is that the difference is of such a nature that the Private Architect should be made aware of this either by the rewording of the present letter of appointment or by the use of separate letters of appointment for new buildings or additions and/or alterations to existing buildings.

6.2 The problems encountered with the remuneration on a time basis are very real involving two major disadvantages.

6.2.1 In the first place, the Private Architect is required to painstakingly keep an accurate record of all the time spent on the project by each individual involved. This record of time must be acceptable to the TPA and should it not be so, this may be either difficult or impossible to disprove. This is all most unsavoury and unscientific.

6.2.2 It is logical that this system will favour the inefficient or slow concern since there is no control over the actual time to be spent and since the reimbursement is quid pro quo, there is no incentive.