

ARCHITECTURAL DESIGN  
OF  
RAMALLAH HIGH SCHOOL.

Presented by :- William Bortcosh.

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ARCHITECTURAL DESIGN

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FOREWORD.

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Signature :-

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## INTRODUCTION.

Before the work of planning a school building is begun, the architect, engineer, and school board must know exactly what is to be taught and how it is to be taught, whether the school is a day school or a boarding school, or both a day and boarding school. The fact that many school buildings are planned and actually constructed by people who have only hazy ideas about these essential points is quite obvious. Very often the fault is mostly if not entirely that of the school board and not that of the architect or engineer. The school board does not come to a definite decision, orders the architect and engineer to go ahead and build a school, and then they use it somehow after it is built.

In Palestine you find many schools with inadequate buildings, the reason being that the school board either bought or rented some buildings which were not meant to be used as a school and turned them into a school, or built the buildings without a careful consideration of the important points mentioned above. The need of properly planned schools therefore arises. During the last twenty five years, public education has developed to a great extent. Educational methods have changed, and it is common sense to assume that the planning and designing of the modern school building must also change with the development and progress of these methods. Furthermore, besides the development of the school building for educational purposes, there is now another use of the schoolhouse, namely, as a community center. This additional use of the school building has greatly increased the problems to be considered in the designing and planning of the school.

## THE PROBLEM.

The site chosen for building the school is one kilometer from Ramallah on the Ramallah-Jerusalem road. The plot at the present time is a vineyard, and the ground is fairly level. A stratum of hard rock exists at a depth of one to two meters, so no precautions or special considerations need to be taken into account in designing the foundations. In planning and designing the school a number of problems arise that have to be tackled. First, the general plan of the school site has to be thought of, the placing and orientation of the buildings, football fields, tennis courts, and volleyball fields have to be considered. Secondly, the planning and designing of the buildings follows with a multitude of problems such as drainage and sanitary fittings, lighting, and ventilation.

These problems are solved to the best of my ability and to the extent that space, time, and this architectural design permit. I am much obliged to Professor Yeremian for his good advice and help.

## CAPACITY OF THE SCHOOL.

The Elementary School:- Eight years of grade school. The Kindergarten, and Forms I - VII.

The most usual number of students in a class is between 24 and 42. A good average is 30, which is chosen for each class of the elementary school including the kindergarten. The number of students in the elementary school is, therefore,  $8 \times 30 = 240$ .

Assuming that one third of the students are boarders and two-thirds day students, the number of boarders will be  $\frac{1}{3} \times 240 = 80$ , and the number of day students will be  $\frac{2}{3} \times 240 = 160$ .

The Secondary School :- Four years of high school. Forms I - IV.

The number of students in each form is taken as 42. Therefore, the number of students in the secondary school is,  $4 \times 42 = 168$ .

Also assuming that one third of the students are boarders and two-thirds day students, the number of boarders will be  $\frac{1}{3} \times 168 = 56$ , and the number of day students will be  $\frac{2}{3} \times 168 = 112$ .

The total number of students in the school will then be  $240 \text{ plus } 168 = 408$ , from which  $80 \text{ plus } 56 = 136$  will be boarders, and  $160 \text{ plus } 112 = 272$  will be day students.

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## THE MAIN BUILDING.

### THE KINDERGARTEN.

Quoting Donovan, "In its broadest sense, the kindergarten is a room more for supervised play than for study, with its dances, games, singing, and its beautiful make believes." In this room the child receives its first impression of school life, and the room must be made as attractive and interesting as possible so that the children may get the maximum amount of joy and pleasure out of their first school year.

The southeast corner of the building is recommended as the best location for the kindergarten. In addition there are two requirements which are important and must not be overlooked. First, it should be on the ground floor, the small pupils should not be made to climb stairs, and second, it should not be built with its floor laid directly on the ground. The reason for this second requirement is that the children sit and play on the floor, and in placing the floor a little higher than the ground helps prevent it from being cold and damp. The kindergarten should be a complete unit, with its separate entrance, toilet, drinking fountain, and porch, so that the little pupils will find all their needs in their section and do not have to go into the main halls and mingle with the older children.

### THE CLASSROOM.

The classroom is the fundamental unit of the school organization. Because of this fact enough study, planning, and time must be given to its design. Before the architect can proceed in its design he has to know the grade and the maximum number of pupils that will occupy the room, and the

type and size of furniture in order to establish the size of the room. There are also other considerations besides the size of the room, some of which are lighting, ventilation, blackboards, and floors.

#### Size Of Classrooms :-

The width of the classroom is of prime importance in its design. Generally, the number of rows of seats across the room is not less than five, but the tendency now is to have more than that number, thus leading to the wider classroom. Many are favouring the wider classroom "as the length of the room is thereby shortened, and it is easier for both teacher and pupils to hear and talk, and there is less eye strain to pupils occupying rear seats in reading matter on the front blackboard."

Deciding on the width of the rear aisle and the distance between the front row of seats and the front wall, the length of the room is determined by the number of seats to each row. Deciding on the width of the two side aisles and the intermediate aisles, the width of the room is determined by the number of seats across the room.

The laws of the country or state usually fix the number of square feet or cubic feet per pupil. Generally, this number is 18 square feet per pupil. Therefore, to accommodate a class of 30 pupils, of course, calls for 540 square feet of floor area, and to accommodate a class of 42 pupils, calls for 756 square feet of floor area. Some countries or states also fix the minimum ceiling height. The minimum height of ceilings for classrooms is fixed at 12 feet, and should never be less than that amount.

Width Of Aisles :-

Usually the window aisle is 24" wide for all classrooms, except for the larger high school classrooms where it may be more. The rear aisles and wall aisles vary from 36" to 30". This is the minimum width that could be used to allow free circulation of the pupils whenever there are blackboards on the side and rear walls of the room. The inner or intermediate aisles are usually 18" wide.

These figures give a general idea of the space needed, and help in the choice and design of the classroom.

TABLE OF SIZES &amp; MEASUREMENTS OF SCHOOL DESKS.\*

Grades	I. II. III.	IV. V. VI.	VII. VIII.
Distance back to back	2' - 1"	2' - 5"	2' - 7"
Distance across	1' - 6"	1' - 9"	2' - 0"
Size of desk	12" X 18"	15" X 21"	16" X 24"
Height of desk	21" to 24"	23" to 28"	26" to 31"

\* Donovan, John J., School Architecture, p. 257.

### Lighting and Ventilation :-

Natural lighting is a very important factor in the plan of a school. In natural lighting careful consideration should be given in both plan and elevation with regard to quantity and quality of the light. Consequently, the selection of the site and the location of the building are of great importance, for poor judgement in either case will make it difficult to orient the classrooms to the position which will give the best natural lighting.

The orientation of classrooms presents a problem upon which there is some difference of opinion among authorities. All agree that the classroom should not face directly south, most believe that it should face east or west, more or less, but the sharp disagreement arises in making the room face the north. Some say that when a room faces the north, "the light is steady throughout the day, it is a good working light, and that there is no difficulty about controlling either light or temperature since there is no direct sunlight." Others, I among them, believe that "a sunless room lacks cheerfulness and that sunlight is beneficial in making a room wholesome." The best way out of this disagreement is to face the classrooms east or west in general, having as few of them as possible facing either directly north or south. This is the usual practice.

### Blackboards :-

When building a new school the question of choosing suitable blackboard material arises. The points that one must consider in selecting blackboard material according to Donovan are, "smoothness of surface, durability, porosity, possibilities for washing and erasing, non-reflectiveness of light,

uniformity in color, and permanency in shade." The best material that fulfills the above requirements is good natural slate. There are other artificial materials that can be substituted for slate, but if natural slate is obtainable it will be advisable to use it.

In addition to the selection of suitable blackboard material there is an important item which must be kept in mind, namely, the reach of pupils. The heights at which the blackboards in the lower grade classrooms must be fixed is less than those of the higher grades. The following table compiled after a series of tests made in Adams Cosmopolitan School, San Francisco \* helps one to judge the proper heights for the blackboards of different grades.

Grade	Height Tallest Pupil Can Reach To Write.	Height Shortest Pupil Can Reach To Write.	Lowest Point Without Stooping Tallest Pupil Can Write.	Lowest Point Without Stooping Shortest Pupil Can Write.
VIII.	6' 4"	5' 11"	3' 0"	2' 8"
VII.	6' 4"	5' 8"	2' 8"	2' 8"
VI.	6' 0"	5' 6"	3' 2"	3' 4"
V.	6' 0"	5' 1"	2' 8"	2' 10"
IV.	6' 0"	4' 9"	3' 3"	2' 6"
III.	5' 7½"	4' 8"	2' 11"	2' 9"
II.	5' 6"	4' 5"	3' 0"	2' 9"
I.	5' 0"	4' 0"	2' 9"	2' 8"

\* Donovan, John J., School Architecture, p. 271.

### Floors :-

In classrooms the seats and desks are usually fixed or fastened to the floor, hence it follows that wood is the material to use for flooring. This practice is seldom found in this part of the world, concrete being the material used in spite of the fact that it is more difficult and expensive to fasten the desks to the floor.

### THE ASSEMBLY HALL.

In a modern school the assembly hall is an integral part of its equipment. Activities carried on in it benefit the students as much as the activities carried on in the classroom. It is the place where the strongest moral influence is exerted on the student body. Besides, if it were used only for assembly, once a day, it would be the most extravagant of features, especially if large enough to accommodate more than the number of students in the school. So, its use is not only confined to the school activities but also to the activities of the community. The assembly hall is therefore, designed to take about 700 seats, which is approximately twice the number of the students in the school, as it is going to be used for the activities of both the school and the community. In Ramallah there is only one assembly hall, and the people there need another badly for such meetings as mass instruction in public speaking, or visual instruction by means of motion pictures and the like.

The assembly hall should be on the ground floor and not in the second or third storey. It should also be accessible from outside the building, so that the public will enter and leave it without getting into the school proper.

The floor should slope towards the front, and the seats should be theatre chairs. The walls should be treated in some way in order to remove the monotony and bareness. The natural illumination of the assembly hall should be from the side. In some cases skylights are used, but this is objectional because of reasons some of which are, the light cannot be shut out for the showing of motion pictures unless certain devices for curtains are used which are expensive and difficult to install, a skylight in the ceiling may be dangerous as people are liable to walk on it, it gathers dust and dirt, and the lighting is unpleasant in the absence of windows.

There should be a good stage in the assembly hall, a simple lecture platform cannot be any longer considered sufficient. It should have a good background and it may have scenery, footlights, etc., which should be installed by an expert in such things. It is advisable to have these essentials of a theatre stage as it provides for the student the environment for appropriate dramatic expression.

#### Seating Capacity :-

In order to determine the seating capacity, an allowance of  $6\frac{1}{2}$  square feet per seat is usually adopted for seats in straight rows, and about  $7\frac{1}{2}$  square feet for those in curved rows. These dimensions provide for aisles but do not include the space for the stage. Assembly hall chairs are made 19", 20", 21", and 22" wide. The 20" wide chairs are chosen for this design as they are approximately 50 cm. wide which is the most common here. From these figures it is evident that, to seat 700 persons, the main floor would have to be about 60' x 75' .

Height :-

The height of the assembly hall is governed by the architectural treatment of the room and the correct cubic space to provide adequate ventilation. A moderate allowance is 150 cubic feet of space per seat. Therefore, a hall 60' x 75', seating 700, would require a height of approximately 23' above the stage level.

Floor :-

A hall having a seating capacity of 500 and less can have its floor level. If the seating capacity is greater than 500, then the floor should be sloped or made saucer-shaped, and the seats should be set on steps. If this is not done the stage will have to be elevated to an abnormal height. Since the seating capacity of our hall is 700, the floor is made sloping towards the stage. It is important that every occupant in the hall has a clear view of the stage, and the following figures will help determine the slope of the floor to provide unobstructed views. The level of the eye should be established at a height of 4' above the level of the steps for the seats, with each step 4" above the one in front, and the height of the stage should be established at 4' above the low point of the hall.

Divisions :-

The most practical division of the main floor of large assembly halls is the three section division. Since our assembly hall is rather small, the main floor was divided into two sections with three aisles, one in the center, and two at the sides as shown in the plan.

Quietness :-

The assembly hall should be located where quietness will prevail. In many designs you find the boiler or the cafeteria placed under the assembly hall. This is the worst place to locate them, both for the safety to the audience and for the satisfactory use of the room. The pleasure a person gets when straining to hear a speaker, or to listen to a musical or dramatic entertainment is not wholesome. Having in mind the above mentioned points I located the assembly hall in the center of the main building.

Exits :-

All assembly halls should have more than one means of exit. Exits should be arranged on the front and sides if possible as well as the rear. In our assembly hall exits were placed at the rear as well as at the two sides.

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THE RESIDENCE BUILDING.

## THE SCHOOL LIBRARY.

The school library is second to no department in the importance of its relation to the whole school plant. The modern school library serves the school and the community in the same way that the college library serves the university. A few years ago, it was considered sufficient to have a single small room with a few shelves containing some text books and a small number of editions for supplementary reading as a library. Today it is different. It is understood that the library is an "institution endowed for the purpose of providing intellectual enlightenment" for the students as well as for the community. It so functions with the school organization that if it is inadequate in size and equipment, or poorly located and administered, the educational efficiency of the school as a whole is greatly impaired.

Location :-

Whether it should be on the ground floor or on the second floor, is largely dependent on how it is going to be used. If it is going to be used by pupils only, the second floor is the more desirable because of quietness. If it is going to be shared by the public, it should be located so that the members of the community will cause the least interruption of the work of the school and that of the pupils in the library. This is the reason for placing the library in the ground floor of the residence building.

Size :-

Donovan recommends an allowance of 20 to 25 square feet for each reader. this will provide floor space for aisles, tables, cases, etc.

## THE DINING HALL.

The dining hall is designed to accommodate all of the boarders, or about 140 persons. The kitchen is placed on one side of it with a pass shelf in-between for passing the food to the serving counter. This method for serving the food helps prevent confusion as students and waiters will not all be rushing in and out of the dining hall and the kitchen at the same time. At the other end of the dining hall a small room for the purpose of washing and storing of dishes and cutlery is provided. This also has a pass shelf, and the students can obtain dishes and cutlery from there easily.

## GENERAL REMARKS.

The first and second floors of the residence building are reserved for sleeping accommodations. The plans of these two floors are identical. In each floor there are eight bed rooms each of which can provide sleeping accommodation for four students. Hence, the number of students that these bed rooms can take is  $16 \times 4 = 64$  students. Every floor has also in the wings two dormitories each of which can provide sleeping accommodation for twenty students. Therefore, the number of students that the dormitories can take is  $4 \times 20 = 80$  students. The total number of students that can be accommodated is, from above,  $64$  plus  $80 = 144$  students, which is in excess of the number of boarders in the school.

The school board may not see it fit to have bed rooms of four each. This can be easily overcome by removing the partition between every two bed rooms, thus turning them into small dormitories of eight beds.

In the first floor is provided a sick room with an adjacent room for the doctor and nurse. These two rooms in the second floor can be used as store rooms, or kept as spare rooms to be used for any purpose that may come up unexpectedly.

The basement consists of two rooms, one, the boiler room, the other, the laundry room. It is convenient to have the laundry room near the boiler room as hot water can be easily obtained. The laundry room was located in the basement with a special entrance so that the washing and ironing can go on without interfering with any work of the school or the students.

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