

# **Chapter I**

## **Introduction**

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## **1-1 Introduction**

Civil engineering can design, build, and maintain the foundation for our modern society “our roads and bridges, drinking water and energy systems, seaports and airports, and the infrastructure for a cleaner environment”, to name just a few.

Building engineering is considered as a branch of civil engineering, and it may be considered as a whole branch standing by itself, it can study all the analysis and designs for all constructions types with its variant applications taking into consideration all dynamic and static effects and its relation with the environment effects involving winds, earthquakes and weather.

In any construction project there are 3 main players:

- Owner: he decides the intended use and occupancy of the construction.
- Architect: he develops the architectural plans and layout.
- Building engineer: he decides a suitable structural framework, estimates the structural loads depending on the building use and occupancy, analyses of the structure to determine member and connection design forces, makes a good design for the structural members and connections, and finally verificates this design with ensuring the safety and serviceability of the structure.

So you can see the main role of the building engineer in the structural projects, involves the structural design, executing the work according to the previous design and supervision of the executed work.

## **1-2 Reasons for choosing the project:**

### **1-2-1 General reasons**

There are several reasons led us to the selection of this project; including reasons related to the nature of the project as a specialized hospital, and the other belonging to personal reasons can be summarized as follows:

1. Emphasis on health value because we live a state of population increasing in generally, and accidents and diseases particularly nowadays.

2. Providing building serves the surrounding environment and works to minimize damage as much as possible.
3. The need for achieving building works to provide healthy atmosphere for Patients taking into consideration their needs to have safe and comfortable environment inside the hospital.

### **1-2-2 Personal reasons**

The need of a structural project as the project team desired, to acquire the structural design skills by linking theoretical aspects that have been gained from the courses studied, and apply it effectively in this project and the contents of various structural elements, the design of these elements to fit with loads located them, taking into consideration the provision of global and durability economy.

Moreover, we would like to submit this project to the architectural and civil engineering department in the Engineering College at Palestine Polytechnic University for completing graduation conditions and gaining a bachelor's degree in building engineering specialist.

### **1-3 Project objectives:**

Objectives of this project are divided into two parts:

#### **1-3-1 Architectural Goals**

In this project architectural design is not the main goal as civil and building engineers; however; our role here as building engineers is to achieve this project with saving the beauty and utility requirements, cost and durability in its facilities, which are the basic of architectural design requirement.

#### **1-3-2 Structural Goals**

Structural design of the units will be done in this project by choosing the most appropriate structural components with its different types for our project to achieve best serviceability, factor of safety as well as the most appropriate economic cost and prepare all structural drawings for beams, slabs, columns, footings and shear walls to be ready for executing the project on reality.

### **1-4 Research problem**

The problem of our project is designing the structural elements of Al-Razi specialized hospital, which is expected to be solved at the end of this project. Our structural design consists of different structural elements involves slabs, beams, columns and foundations taking into consideration its structural distribution without any conflict with the architectural design.

### **1-5 Methodology:**

1. Preparation of architectural plans completed and evaluated in terms of architecture and its compatibility with the objectives of the project and its services.
2. Study of structural elements and choosing the most appropriate mechanism for the distribution of these elements as columns, beams, ribs which don't collide with architectural design topic and achieve the economic aspect and Security.
3. Analysis of the structural elements and loads affecting them.
4. Design of structural elements based on the results of the analysis.
5. Design by different design programs.
6. Completion plans of structural elements which have been designed to project the final and executable drawings.

### **1-6 scope of the Project**

Project contains several chapters as follows:

7. Chapter One: general introduction to the project.
8. Chapter Two: architectural description of the project.
9. Chapter Three: description of the structural elements of the project.
10. Chapter Four: Analysis and structural design of all structural elements.
11. Chapter Five: The results that have been reached and recommendations.

### 1-7 Time schedule

The expected time table of the first and second semester of the year 2017\2018.

Suggested Time	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	
Project Selection																																			
Site Study																																			
Collect information about the project																																			
Architectural study of the building																																			
Structural study of the building																																			
Preparation of graduation project introduction																																			
Make the presentation																																			
Structural analysis																																			
Structural design																																			
Preparation of construction drawings of the project																																			
Writing the document																																			
Stand by time																																			
Presentation of the project																																			

Table 1-1: time schedule table.