EARTHQUAKE DESIGN OF A HIGH RISE OFFICE BUILDING
IN ACCORDANCE WITH THE CYPRUS SEISMIC CODE

By

Anastasia S. Papageorgiou

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CHAPTER [1.0]

INTRODUCTION

A reinforced concrete structure is a combination of beams, columns, slabs and walls rigidly connected to form a *monolithic* frame.It is important to determine all the forces in each member so that all members are capable of resisting them.

To carry out a *full analysis of a rigid frame* is a difficult task especially when earthquake action is considered as a critical action in conjuction with other permanent or variable actions.The structural analysis begins with the evaluation of all the loads carried by the structure including of course its self-weight.The nature of the loads is such that they are varible both in magnitude and position.Therefore all possible critical load arrangments must be considered.When dealing with seismic situations horizontal design forces are also applied at each floor level.

If earthquake action is taken into consideration then the forces in each member can be determined either by manual calculations or computer methods.Computer methods are nowadays widely used since manual calculations procedure is very long and difficult.

The aim of this project is to carry out the earhquake design of a three storey office building in accordance with the *Cyprus Seismic Code for Reinforced Concrete Structures* and the *BS8110 Structural Use Of Concrete:Part 1*.

To do so familiarity is necessary with a computer program for computerized design of reinforced concrete beams, developed by an H.T.I student in 1995 as part of his 3rd year project.

The program mentioned above is used in order to determine the forces (axial, shear,moment) in each member since it requires a long and difficult procedure to carry out manual calculations for structural analysis.The difficulty induces in that earthquake action is considered as critical action and horizontal design forces are applied at each fllor level.These design lateral forces make it difficult to perform manual calculations.

Except from the actual design the basic purpose of the project is to make the student familiar with the use, scope and field of application of the *Cyprus Seismic Code.*

This code sets down minimum design requirements to be met when dealing with seismic, situations.

The aim of seismic design is to save human lives , to ensure the continuation of vital services, to minimise property loss.

The code applies to reinforced concrete buildings for ordinary uses. As it has been shown by the San Francisco earthquake (1906) and the Kanto earthquake (1923) reinforced concrete structures are far better than masonry structures with regard to earthquake resistance. Since they are also economical they have been constructed in earthquake - prone areas, and decrease of the damages caused by earthquakes has been observed because of the improvement of earthquake design codes.

The project is constructed of five chapters which are :
Chapter 1 : Introduction
Chapter 2 : Seismic Hazard in Cyprus
Chapter 3 : Seismic Action in Cyprus
Chapter 4 : Design
Chapter 5 : Detailing

Regarding the design process, for the structural analysis of the beams and the columns the computer program mentioned above is used while the structural analysis of the slabs is done manually.
The bending moment and shear force diagrams as well as the design procedure, calculation and detailing , these are carried out manually.

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