

DESIGN OF A SWIMMING POOL

by

GEORGE YIANNIKOS

Project Report

Submitted to

the Department of Civil Engineering

of the Higher Technical Institute

Nicosia Cyprus

in partial fulfillment of the requirements

for the diploma of

TECHNICIAN ENGINEER

in

CIVIL ENGINEERING

June 1994



Acknowledgements

I wish to express my sincere thanks to my project supervisor Mr M.Poyllaides for his valuable guidance.

I would also like to thank A + I Philipou technical office, Aguamasters and Relax swimming pool constructions for their assistance and material they had offered.

Finally, this project is dedicated to my family who supported me ethically throughout, my friends and to the whole department of civil engineering of the H.T.I.

Summary

Title Design of a swimming pool

Author George Yiannikos

This project was performed so that the field of swimming pools to be covered as comprehensive and fulfilling as possible, giving more emphasis in the design.

This project begins with the most essential theory highlights including subjects like circulation, plantroom and joints. Then continuous with the structural design a detailed analysis of the reinforced walls and ground floors with checks for shear and deflection. In addition, the minimum reinforcement, crack spacings and widths for walls and floors were calculated based on the limit state design. Finally a number of drawings was produced showing the structural details, landscape and basic equipment.

In the deep end the height of the water is 3m and in the shallow end it is 1m. The volume of the pool water is about 232m^3 and has a total water surface of 108m^2 approximately.

The shape of the pool was borne through my imagination. I find it unique, a little bit peculiar and different from the other standard types.

The objectives given by the supervisor are listed below:

1. To design the reinforced concrete framework of a swimming pool.
2. To detail typical slabs, retaining walls and foundations and prepare their respective bending schedules.

Terms and Conditions:-

1. Dimensions of the swimming pool will be given by the supervisor.
2. Use concrete grade 30 throughout the structure.
3. The soil pressure on the foundations is not to exceed 200KN/m^2
4. Visits to various places to see the pipework and functioning of swimming pools.
5. Design to conform with the relevant British Standards.

Supervisor : M Poullaides

External Assessor : St. Koumbaros

Contents

	<u>Page</u>
Title page	I
Acknowledgement	II
Summary	IV
Notation-symbols	1
Section one. Essential theory	
1.1 Introduction	4
1.2 Planning	5
1.3 Budgeting	5
1.4 Construction sequence	5
1.5 Swimming pool types	6
1.6 Substructure construction methods	6
1.7 Swimming pool finishes	9
1.8 Plantroom operations	10
1.9 Circulation operations	10
1.10 Facing problems	11
1.11 Watertightness testing	12
1.12 Maintenance	12
1.13 Usefull accessories	12
1.14 Landscaping	13
1.15 Safety	13
1.16 Joints	19
Section two. Structural design	
2.1 Volume calculation	29
2.2 Pool without water (3m height). Checks	31
2.3 Pool with water (3m height). Checks	38
2.4 Pool without water (1m height). Checks	45
2.5 Pool with water (1m height). Checks	51
2.6 Cracking of concrete	56
2.7 Calculation of minimum reinforcement according to BS8007. (wall and groundfloor)	

2.8	Calculation of crack spacings and widths for direct tension in Immature concrete (Wall & Floor)	60
2.9	Calculation of crack widths for flexural tension and direct tension in mature concrete (walls)	61
2.10	Calculation of crack widths for direct tension in mature concrete (ground floor)	

Section three. Appendices

3.1	Pictured types and methods of construction	70
3.2	Plantroom equipment figures	74
3.3	Pool extras	78
3.4	Joints - sealants	79
3.5	Miscellaneous	86
3.6	Bibliography	92

Section four. Drawings