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STUDY OF THE BEHAVIOUR OF FOOTINGS IN EXTENDED SWELLING SOILS.

M.Sc. THESIS

SUBMITTED TO GEOLOGICAL ENGINEERING DEPARTMENT.
FACULTY OF PETROLEUM AND MINING ENGINEERING
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ABSTRACT

Foundations in swelling clays are frequently subjected to severe movements as a result of moisture changes within the clay formations, these movements cause destruction of structures.

Numerous remedies for foundations and soils have been developed, but till now, they do not provide the complete success. The treatment of this problem by using a sand cushion beneath the footing is one of these remedies, which, may control and overcome the problem.

This investigation aims at studying the behaviour of isolated footings when they are directly placed on such soils, and when using a sand cushion beneath the isolated footing. The goal isto provide the engineer ability to deal with the swelling soils with suitable dimensions for the isolated footing and the cushion for minimizing the upheaval resulting from the swelling soil.

Some experimental work was carried out on the swelling clay samples for measuring their swelling pressure and understanding the nature of the problem.

The finite element technique was used for simulating the problem, the concrete is used for simulating the isolated footing, a sandy soil was used as a cushion beneath the footing, and spring support is used as a boundary element for simulating the swelling soil. A computer software program (SAP90) is used for three-dimensional analysis of the problem.

Some factors affecting the upheaval resulting from swelling are studied, these factors are the dimensions of the footing and the sand cushion, and the loads acting on the footing. In some cases of study, the clay surface around the footing is absolutely free from any surcharge, while in other cases it is loaded by uniformly distributed surcharge pressure around the footing. The study extends to study the heaving of the clay soil around the footing and comparing between both the heaving of soil and the cushion.

The results of these investigation showed that a great benefit when using the sand cushion beneath the footing, however such arrangement reduces the harmful effect of the swelling clay.

CONTENTS

	Page
ACKNOWLEDGEMENT.....	i
ABSTRACT.....	ii
CONTENTS.....	iii
LIST OF TABLES.....	vii
LIST OF FIGURES.....	viii
NOTATIONS.....	xi
 CHAPTER 1 : INTRODUCTION.....	 1
 CHAPTER 2 : PROPERTIES OF SWELLING SOILS.....	 3
2.1 General.....	3
2.2 Definition of Expansive Soil.....	4
2.3 The Mineralogical Composition of Clay	4
2.3.1 Composition of Clay minerals.....	5
2.3.2 Cation Exchange capacity.....	9
2.3.3 Water in Clay Minerals.....	11
2.4 Mechanism of Swelling.....	11
2.5 Laboratory Identification of Soil.....	14
2.5.1 Indirect Methods.....	15
2.5.1.a. Free swelling.....	15
2.5.1.b. Colloidal Content.....	16
2.5.1.c. Atterberg Limits.....	16
2.5.1.d. Linear Shrinkage.....	18
2.5.1.e. Activity of the Soil.....	18
2.5.1.f. Dielectric Dispersion.....	19
2.5.2 Direct Methods.....	19
2.5.2.1. Methods of Measuring of Swelling Pressure.....	21
2.5.2.1.a. Constant Volume Swell.....	22
2.5.2.1.b. Simple Odometer.....	22
2.5.2.1.c. Double Odometer.....	22
2.5.2.1.d. Different Pressures Method.....	22
2.5.2.2 Discussion of Some Factors Affecting Swelling Pressure.....	24

	page
2.5.2.2.1. Initial Moisture Content.....	24
2.5.2.2.2 . Initial Dry Density.....	24
2.5.2.2.3. Soil Structure.....	25
2.5.2.2.4. Concentration of Electrolytes in Pore Water.....	25
2.5.2.2.5.. Time Allowed for Swelling.....	25
2.5.2.2.6. Surcharge Pressure and Confinement.....	30
2.5.2.2.7. Specimen Dimensions.....	30
2.5.2.2.8. Stress History.....	30
2.5.2.2.9. Clay Mineralogy and Clay Percentage.....	30
2.5.3. Combination Techniques.....	31
 CHAPTER 3 : REMEDIES OF FOUNDATIONS ON EXPANSIVE SOILS.....	 32
3.1 Introduction.....	32
3.2 Footing on Expansive soils.....	32
3.3 Different Types of Footing Foundations on Expansive Soil.....	33
3.3.1 Continuous Footing.....	33
3.3.1.a. Wall Footing.....	33
3.3.1.b. Strip Continuous Footing.....	33
3.3.1.c. Box Construction.....	33
3.4 Isolated Footing Foundation.....	35
3.5 Prediction of Heave.....	36
3.6 Alternative Remedies for Expansion Problem.....	40
3.6.1 Relocation the Structure to another Site.....	40
3.6.2 Reduction of the Influence of Moisture Variation...40	
3.6.3 Chemical Treatment of the Expansive Soil.....	41
3.6.4 Heavy Loading the Swelling Soil.....	43
3.6.5 Designing a Structurally Rigid Foundation.....	43
3.6.6 Isolating The structure from the Expansive Soil....	43
3.6.7 Using of Non-Expansive Soil Cushion.....	44
3.6.7.1. Factors Affecting the Success of Cushion.	45
3.6.7.2. Prewetting for Minimizing the Sub-grade Heaving....	45
3.6.7.3. Compaction Control.....	47
3.6.7.4. Type oF Soil Replacement Material.....	47
3.6.7.5. Depth and Extent of Cushion.....	47

3.6.7.6.	Evaluation of Using Soil Cushion.....	49
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CHAPTER 4:	DETERMINATION OF SOIL PROPERTIES.....	52
------------	---------------------------------------	----

4.1	General.....	52
4.2	Physical and Engineering Properties for Different Soils.....	52
4.2.1	Wadi-Hagoul Area.....	52
4.2.1.1.	Index Properties of The Used Clay.....	52
4.2.1.2.	Grain Size Distribution.....	53
4.2.1.3.	Compaction Tests.....	53
4.2.1.4.	Chemical Analysis.....	53
4.3	Swelling Characteristics of the Used Clay Soils.....	53
4.3.1.	Swelling Pressure Determination.....	58
4.3.2.	Swelling-Time Characteristic.....	61
4.3.3.2.	Swelling-Time Characteristics under Different Loads..	61

CHAPTER 5:	THEORETICAL ANALYSIS AND DISCUSSION OF RESULTS.....	65
------------	---	----

5.1	Introduction.....	65
5.2	Applicability of the Theory of Elasticity for Swelling Soils.....	65
5.3	Beam on Elastic Foundation.....	66
5.3.1	Winkler Model.....	66
5.3.2	Elastic Foundation According to Vlasof-Leontiev Approach.....	67
5.3.3	BRAB Model.....	67
5.4	Finite Element Program.....	69
5.4.1	General.....	69
5.4.2	SAP90 Program.....	69
5.4.3	The SOLID Element.....	70
5.4.4	SAP90 Terminology.....	70
5.4.4.1..	Joints and Elements.....	72
5.4.4.2.	Global and Local Coordinate Systems.....	72
5.4.4.3.	Degrees of Freedom.....	72
5.4.5.	Material Conditions.....	73

	Page
5.4.6. Units.....	73
5.4.7. Solution Accuracy.....	73
5.5. Finite Element Method.....	73
5.6. Analysis and Results.....	74
5.6.7.1. Finite Element Mesh.....	76
5.7 Computer Model.....	76
5.8 Effect of Thickness Of Cushion On the Heaving of Footing.....	80
5.9 Effect of Thickness of Footing on its Heaving.....	80
5.10 Effect of Depth of Clay Bed.....	83
5.11. Effect of Loading on the Behaviour of Isolated Footings.....	83
5.12. Effect of Surcharge around the Footing.....	88
5.13. Effect of the Breadth of Cushion.....	88
5.14. Rigidity of Footing under Swelling Pressure.....	93
5.15. The Applicability of Reaching Zero Heaving.....	93
CHAPTER 6 CONCLUSIONS.....	99
REFERENCES.....	102

LIST OF TABLES

Table		Page
2-1	The principal clay minerals and aluminum hydroxide minerals.....	10
2-2	Ranges of cation exchange capacity of some clay minerals.....	10
2-3	Atterberg limits values of clay minerals with various adsorbed cations.....	10
2-4	Potential swell classification according liquid limit values.....	20
2-5	Relation between liquid limit, shrinkage limit, and degree of expansion.....	20
2-6	Activity values of some clay minerals.....	20
4-1	Some physical and engineering properties of the high alumina and high silica clay.....	54
4-2	Results of the grain size distribution (wet analysis).....	54
4-3	Results of compaction test (Modified proctor test).....	54
4-4	Chemical analysis of Wadi-Hagoul expansive soil samples.....	57
5-1	Typical ranges of values of modulus of elasticity.....	78
5-2	Ranges of Poisson's ratio.....	78
5-3	The properties of footing, cushion and filling.....	78

LIST OF FIGURES

Figure		Page
2-1	Composition of clay minerals.....	6
2-2	Atomic structure of kaolinite and montmorillonite.....	7
2-3	Diagram of the structure of kaolinite, illite, and montmorillonite.....	8
2-4	Diffuse double layer.....	12
2-5	Dipole character of water.....	12
2-6	Clay water.....	13
2-7	Relationship between percentage of swell and percentage of clay sizes for experimental soils.....	17
2-8	Determination of swelling pressure.....	23
2-9	Relationship between density and volume increases for constant initial moisture content samples.....	26
2-10	Effect of varying density on volume change for constant moisture content samples.....	27
2-11	Effect of varying density on swelling pressure for constant moisture content samples.....	28
2-12	Effect of varying dry density on swelling pressure at constant moisture content	29
3-1	Section through reinforced brick wall.....	34
3-2	Isolated footing placed on non-expansive soil.....	36
3-3	Relation between voids ratio and applied pressure.....	37
3-4	Hypothetical example showing method of computing maximum anticipated soil heave.....	39
3-5	Suggested extent of replacement for basement and non-basement conditions.....	50
4-1	Grain size distribution curves (wet analysis).....	55
4-2	Compaction test (modified proctor test).....	56
4-3	Swelling pressure determination (loaded and expanded method).....	59
4-4	Swelling pressure determination (expanded and loaded method).....	60
4-5	Swelling-time characteristics under different loads for high silica clay	62

Figure	Page
4-6 Swelling-Time characteristics under different loads for high alumina clay.....	63
4-7 Relation between time and swelling percentage under surcharge load 1 kg/cm^2	64
4-7 Swelling-time characteristics under different loads for high silica clay.....	64
5-1 Winkler representation (beam on elastic foundation)....	68
5-2 Elastic foundation according to Vlasof-Leontief approach.....	68
5-3 Flow chart for illustrating the finite element program (SAP90 program)	71
5-4 Finite element mesh for simulating the investigated problem.....	75
5-5 Vertical sections for illustrating the studying variables.....	77
5-6 Effect of thickness of cushion on the behaviour for both soil and cushion.....	81
5-7 Effect of the rigidity of footing on its heaving.....	82
5-8 Effect of the rigidity of footing on the heaving of soil.....	84
5-9 Effect of the rigidity of footing on the heaving of soil and the footing.....	85
5-10 Relation between T/t and heaving percentage at different thicknesses of clay bed.....	86
5-11 Relation between D/T and heaving percentage.....	87
5-12 Relation between T/t and heaving percentage under different concentrated loads.....	89
5-13 Relation between T/t and heaving percentage under different distributed loads.....	90
5-14 Effect of surcharge loads around footing.....	91
5-15 Effect of breadth of cushion and footing (without surcharge around the footing).....	92
5-16 Effect of breadth of cushion and footing (with surcharge around the footing).....	94
5-17 Effect of breadth of cushion and surcharge around the footing.....	95