Abstract

The triaxial test is designed to measure the effective shear strength of the selected soil sample or solid. Normally, the sample shear strength is derived from the obtained parameters of the soil samples tested. Triaxial tests is very reliable because it can be used to measure strength of the material in both saturation and dry conditions, as well as both drained and undrained.

Currently the new equipment has been developed by the geotechnical division of the Norwegian University of Science and Technology for triaxial testing of soil. The simplified and reliable procedures for the use of this specific new triaxial equipment have to be developed for academic purposes, mainly for students' use.

The developed procedures have to include the report which covers the triaxial test background; types of triaxial tests mostly those which can be done using this triaxial equipment; the equipment and its devices and how they work together and the trial tests results which will be done using this equipment.

With this report, the online students help video was developed during trial triaxial tests. The online students help video shows sample preparation and placing it on the equipment for both insitu and build up. Clay sample was used for insitu undisturbed samples while sand was used for build up samples. It also shows how to do the pre test checkups including flushing the filter stones and regulating the confining pressure. The video shows how to start the consolidation and how to determine when the consolidation is over and how to start the shearing phase. Lastly it shows how to remove the sample when the test is done.

Several triaxial tests were done on this equipment (The results of the two trial tests are attached to this report as Appendix A) to evaluate how it is working as well as its performance, and the outputs were interpreted as shown in the following chapters. These tests were done in different types of soil with varying conditions in consolidation and drainage.

The total of two trial tests were done using this equipment, using the developed procedure, this tests including;

- 1: Consolidated Undrained Triaxial test (Compression) on clay
- 2: Consolidated Drained Triaxial test (Extension) on sand

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List of symbols, abbreviations and definitions

Symbol: Meaning:

- A_c Corrected area of the sample
- A₀ Original area of the sample
- C_u Coefficient of uniformity
- D_e Effective diameter
- D_m Module diameter,
- d_{60} Diameter of soil particles of which 60% are finer
- Δr Increase in diameter
- ΔV_a Axial volumetric change
- ΔV_r Radial volumetric change
- ϵ_a Axial strain
- $\epsilon_r \qquad \text{Radial strain}$
- ϵ_v Volumetric strain
- ε_{av} Volumetric axial strain
- ε_{rv} Volumetric radial strain
- L Height of sample
- n Porosity
- n_{max} Maximum porosity
- n_{min} Minimum porosity

- r_s Density of solid particles
- σ_3 Confining pressure
- t_r Thickness of the rubber membrane
- V_b Bulk volume
- V_o Initial volume
- δ_b Bulk density
- w_s Weight of sample

Abbreviations

Symbol: Meaning:

- C-D Consolidated Drained triaxial test
- C-U Consolidated Undrained triaxial test
- OSH Online Student Help
- U-U Unconsolidated Undrained triaxial test

Definitions

Words:	Also mean:
Inlet pressure control	Air pressure regulator
Porous stones	Filter stones
Eye wear	Safety goggles
Membrane stretcher	Split mould

Water weight scale

Weight measuring device

Pyrex glass cell cover Triaxial cell cover

Table of contents

Abstract		•••		 	•••	•••	 	 ii
Acknowledge	ment			 			 	 iv
List of symbol	ls and r	otatio	ns	 			 	 v
Table of conte	ents	•••		 			 	 viii

Chapter 1: Introduction

1.1 Background			 	 	 	 1
1.2 Scope			 	 	 	 1
1.3 Methodology			 	 	 	 2
1.4 Organization of	the rep	oort	 	 	 	 2

Chapter 2: Review of triaxial test

2.1 Introduction					 	 	 4
2.2 Sample preparat	ion				 	 	 5
2.3 Consolidation an	id corre	ction du	ue to it		 	 	 5
2.4 Types of consolid	dation				 	 	 6
2.5 Types of test pro	cedure	s			 	 	 7
2.6 Types of triaxial	tests				 	 	 10
2.6.1 Consolidated D	Drained	triaxial	test		 	 	 10
2.6.2 Consolidated L	Jndrain	ed triax	ial test		 	 	 11
2.6.3 Unconsolidate	d Undra	ained tri	iaxial te	st	 	 	 12
2.7 Multistage triaxi	al test				 	 	 12
2.8 Errors in triaxial t	est and	l their co	orrectio	ns	 	 	 14

2.8.1 End restraints effect			 	 	 	14
2.8.2 Necking			 	 	 	15
2.8.3 Area disruption and co	on	 	 	 	16	
2.8.4 Membrane correction			 	 	 	17

Chapter 3: Testing equipment

3.1 Introduction				 	 	 	19
3.2 Testing equipme	nt			 	 	 	21
3.2.1 Triaxial cell and	d loadin	g syste	m	 	 	 	21
3.2.2 Data logging sy	rstem			 	 	 	26
3.2.3 Equipment safe	ety syst	em		 	 	 	28

Chapter 4: Soil sample, test procedure and data analysis

4.1 Introduction							 	 30
4.2 Soil used on the	equipm	ent					 	 31
4.2.1 Clay soil							 	 31
4.2.2 Sand soil							 	 33
4.3 Soil sample prep	aration						 	 34
4.3.1 Sand soil samp	le prepa	aration					 	 34
4.3.2 Clay soil sampl	e prepa	ration					 	 37
4.4 Testing							 	 39
4.4.1 Phase I: Conso	lidation						 	 39
4.4.2 Phase II: Shear	ing						 	 42
4.4.2.1 Types of shea	aring us	ed (Unc	Irained	and Dra	ained sh	earing)	 	 43

4.4.2.2 Methods of shearing used (Compression and Extension)								 	44
4.5 After the test								 	45

Chapter 5: Conclusion and recommendations

5.1 Conclusion		 	 	 	 	46
5.2 Recommendatio	ons	 	 	 	 	46

Bibliography		•••	•••	•••	•••			•••	•••	48
--------------	--	-----	-----	-----	-----	--	--	-----	-----	----

Appendices

Appendix A: Trial test results	••		 •••	 50
A-1: Consolidated undrained triaxial compression tes	st on o	clay	 	 50
A-2: Consolidated drained triaxial extension test on s	and		 	 52

Appendix B: Online student help in the disc						55
---	--	--	--	--	--	----