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SUBMITTED TO ENGR. WAQAR ALI

SUBMITTED BY 7870

SUBJECT GEOTECHNICAL ENGR

SECTION B

ASSIGNMENT # 01

Q1 write a geotechnical report of any civil engineering project which is close to your home town?

Ans This is a geotechnical report of FC Head quarters Malakand.

INTRODUCTION: This report is carried out for geotechnical investigation of boundary wall FC HQ Malakand. The purpose of this investigation was to evaluate the subsurface conditions on the site in the area of the proposed building and to provide geotechnical bearing capacity and recommendations for the condition.

### PROJECT DESCRIPTION:

The 2250 Kanal property is located in a under developed region of FC HQ Malakand. The project will include construction of a new boundary wall occupying the entire property.

### GEOLOGIC OVERVIEW:-

The project site is located in the Malakand Road. Malakand lies between the Mountain and ~~K~~ Northern site of Swat

It is an alluvial plain of 800 km<sup>2</sup> and its catchment extent to china borders. The mountain bordering the alluvial plain are mostly composed of late tertiary age flood. Assumed that these rock extend as basement rock Sarawak group. During the Upper pleistocene and Holocene. The basin been filled with silt, clay, sand and gravels.

SEISMICITY: Malakand Agency lies in the seismically active zone, which is evident in the earthquake catalogue map, indicating the magnitude of past earthquake events. This construction site belongs to seismic zone 2A with peak horizontal acceleration varying from 0.09 to 0.17g.

### SUBSURFACE

Five exploratory borings and three pits were excavated in the area of the proposed boundary wall. In general, our exploratory boring, encountered predominantly silt upto 5ft and after clayey soil upto 2ft depth.

### LABORATORY TEST

Unconfined compression tests, Direct shear test and consolidation test were performed on undisturbed soil specimens, obtained from

boreholes and test pits using Shelby tube and blow sampler. Additionally permeability limit test. sieve analysis moisture content tests were conducted on disturbed samples for classification purpose.

### GROUND WATER:

Ground seepage water table was encountered in borehole NO 2 & 3 at 12ft depth from ground level.

### CONCLUSIONS & RECOMMENDATIONS:-

- Keeping in view results of the field and lab tests, it is concluded that bearing capacity of 0.50 TSP may be adapted for strip foundation at 5ft for the construction of boundary wall, Fc HG Malanand.
- Since the shrinkage value of Foundation lies between 21-28, which shows soil class of very poor quality. It is recommended to replace the Foundation soil with well graded gravel and properly compact it.
- There is no risk of chemical attack on concrete as the chemical content of soil is in permissible range.

In case of missionary wall provide RCC column at soft interval and step beam at the top of foundation RCC slab to reduce differential settlement.

### RESULTS:-

### TERZAGHI & SPT Valve Based

S.No	Reference Marking	Bulk Density (R.f)	MC (%)	L.L (%)	P.L (%)	Classification of Soil (Depth of lift)	Safe bearing Capacity TSB Terzaghi SPT	
1	B.H 1	107.5	12.2	26.7	20.9	ML	0.46	0.9
2	B.H 2	106.6	11.3	25.6	21.6	ML	0.47	0.8
3	B.H 3	105.4	10.5	23.5	23.2	ML	0.49	0.5
4	B.H 4	103.7	8.6	24.9	19.4	ML	0.43	0.43
5	B.H 5	105.3	12.6	20.0	21.0	ML	0.45	0.33

BH/TP ID

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5

	BH-1	BH-2	BH-3	BH-4	BH-5	TP-1	TP-2	TP-3
$W_1 = \text{wt of wet soil + con (g)}$								
$W_2 = \text{wt of dry soil + con (g)}$	1.949	1.941	1.894	1.972	1.916	0.485	0.478	0.481
$W_3 = \text{wt of container (g)}$	0.969	0.977	1.592	1.982	0.976	0.486	0.185	0.496
vol of core cutter (cm <sup>3</sup> )	0.999	0.982	0.982	0.008	0.884	0.243	0.96	0.295
Density $(= W_3 / \text{vol (dry/cu)})$	105.2	107.7	104.9	106.2	103	104.36	105.3	105.4

FIELD DENSITY TEST

BH ID	BH-1	BH-2	BH-3	BH-4	BH-5
$W_1 = \text{wt of wet soil + con (g)}$	37.91	46.00	32.20	42.49	27.60
$W_2 = \text{wt of dry soil + con (g)}$	36.50	43.70	36.30	41.40	25.90
$W_3 = \text{wt of water } (W_1 - W_2)$	12.10	45.60	17.00	3.19	1.70
$W_4 = \text{wt of dry soil } (W_2 - W_3)$	24.10	3.30	18.10	37.60	12.30
$C = W_3 / W_2 \times 100\%$	11.2	10.5	11.6	8.5	12.5

NATURAL MOISTURE CONTENT

BH/TP ID	TP-1	TP-2	TP-3
Shrinkage Limit	20.6	23.46	27.60
Shrinkage Ratio	1.6	2.0	1.8
Shrinkage Limit			

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6

CONSOLIDATION TEST

Borehole (1)	Material	Soil compressibility				
		Compression index ( $C_c$ )	Swelling index ( $C_s$ )	Coefficient of Volume Compress ibility ( $C_v$ )	Decompression index ( $C_s$ )	Coefficient of consolidation ( $C_u$ ) cm/sec
BH-01	Silt	0.256	0.0502	0.052	0.05	0.669
BH-02	Clay	0.154	0.256	0.03	0.0255	0.0022

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SECTION B

QUIZ # 01



Q. Write a note on Different softwear which are used in geotechnical engineering.

ANS Following are the different softwear used in geotechnical Engineering.

### 1 3DEEP VERTICAL REALITY SOFTWARE FOR DEEP EXCAVATION

This is the first softwear fully integrated with a design softwear package for automatic model generation. For the first time, you can easily demonstrate to your clients what your work is all about before pulling a single shovel in the ground.

- unlimited walls and number of excavations.
- multiple stages in same model.
- single button integration from Deep 2008.
- view walls and footings.
- Multiple wall types.

## 2 ALP - LATERAL-LOADED PILES ANALYSIS SOFTWARE:-

ALP analysis you to analyze laterally loaded piles with ease, producing outputs such as comparison graphs in mins. The software predicts the pressure, horizontal moments included in a pile when subjected to lateral loads; bending moment and imposed soil displacement lateral load and bending moment can be applied at any point down the pile, as well as partial or full, lateral or bending moment restraints.

## 3 AMRETRAIN SOFTWARE:-

It is a software for checking single or double retaining walls made of Arcelor Mittal, sheet piles. It has been developed by Terrasol for Arcelor Mittal and is based on commercial software K-Retain. Retain calculation is based on the "subgrade reaction calculation method." but also includes 3 checks according to the french standard NF D94-282;

i) Failure on the passive side

ii) Balance of vertical forces

iii) Kranz

It also enables the calculation of double walls and day wells.