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Assignment

❖ **Write a geotechnical report of any civil engineering project which is close to your home town.**

(Geotechnical Report on Bus Rapid Transit (BRT) Peshawar)

Abstract: *This is the geotechnical report of grand construction of BRT. The report contain technical details, skills, different working standards, which are compulsory for the construction of BRT.*

Introduction: *Bus Rapid Transit (BRT) located in Peshawar city, is a high-quality bus-based transit system that is built to deliver fast, comfortable, and cost-effective services at metro-level capacities. It does this through the provision of dedicated lanes, with busways and iconic stations typically aligned to the center of the road, off-board fare collection, and fast and frequent operations.*

Project Duration: *Construction of the project, under the Peshawar Development Authority (PDA), began on 29 October 2017, and is being executed by the Peshawar Development Authority. TransPeshawar was originally planned to use a fleet of 255 buses, of which 155 will be 12 meter-long buses, while 65 will be 18 meter-long articulated buses.The system will have 30 stations and will be mostly elevated Buses will arrive every 3 minutes during peak hours, and every 5 minutes during non-peak hours.*

Phases Of Project Investigation:

1). Reconnaissance Survey: *It is the first phase of Project investigation for geotechnical report. In this phase the following data about the project is collected:*

- *Different access routes to the project site.*
- *Availability of daily life needs such as supply of food and water, electricity, machinery for construction.*
- *Safety requirement and needs.*
- *Traffic control services.*

2). Office Study: *The second phase is the study of pre-existing information, geotechnical data and documents of the project such as maps, plans and photographs. This data will be provided by the local authorities of that area such PDA in Peshawar.*

3). Site Investigation: *The site investigation involves the geotechnical study of the soil of that area, to estimate the effect of different loads on soil surfaces and the reaction of soil against that loads and the type of construction required according to that soil properties.*

The following type of tests are to be performed to know the internal properties of that soil.

1-Sieve Analysis of Soil

2-Determination of Moisture Content of Soil

3-Analysis Specific Gravity of Soil

4-Determination of Free Swell Index of Soil

5-Determination of Liquid Limit of Soil

6-Determination The Plastic Limit of Soil

7-California Bearing Ratio Test (CBR)

8-Unconfined Compression Strength

Test Results:

Soil Type	*Granular Soil*
% Passing Sieve No.200	94.43%
Liquid Limit	27.16%
Plastic Limit	37.5%
Plasticity Index	6.3%
Shrinkage Limit	0.16%
Optimum Moisture Content	5.852%
Maximum Dry Density	1.88(Kg/$m3$)
California Bearing Ratio	11.21%
Unconfined Compression Strength	185.22(KN/$m2$)
Natural Moisture Content	10.9%
Specific Gravity	2.146

QUIZ

Write a note different software which are used in Geotechnical Engineering.

Softwares used in Geotechnical Engineering: *A high variety of geotechnical software can be found in this category. The famous softwares used in the field of Geotechnical Engineering are mentioned below:*

1- *DEEP: This software is fully integrated with a design software package for automatic model generation. It is a virtual reality software for deep excavations.*

2- *RockPlane: It is a software tool for the evaluation of localized instability rocky elements affected by seismic movements and/or by presence of water pressures within inter-surface fractures. The software provides slide and overturning risk safety factors that enable verification of the stability of the block and as required the design of stabilization works using active or passive anchors and nails.*

3- *ACCECALC: The program analyses the behaviour of the rock slopes under seismic conditions. It evaluates the displacements of a rock block subject to dynamic forces, on the basis of a given accelerogram.*

4- *ADONIS: is Free Finite Element Software for Geo-Engineers. The goal of the ADONIS development is to improve the modeling and computational simulation in geotechnical engineering.*

5- *GEO5: It can be used for Excavation design, Shallow foundation and deep foundation design, stability analysis, settlement analysis and for various other field tests. GEO STUDIO: The GeoStudio suite includes eight products which can be used for analysing slope stability, ground*

water seepage, stress deformations and various other geotechnical problems.

6- <u>*PLAXIS:*</u> *PLAXIX 2D , Plaxis 3D is a finite element package intended for the two dimensional and 3 dimensional analysis of deformation and stability of soil structures, as well as groundwater and heat flow, in geo-engineering applications such as excavation, foundations, embankments and tunnels.*

7- <u>*FLAC3D*</u>*: It is used in advanced geotechnical analysis of soil, rock, and structural support in three dimensions. FLAC3D is used in analysis, testing, and design by geotechnical, civil, and mining engineers.*

8- <u>*EDUSHAKE*</u>*: It is normally used for earthquake and Geo Technical analysis.*

9- <u>*MATLAB*</u>*: It uses mathematical simulation for analyzing structural and foundation problems using series of arrays.*

10-   <u>*ALLPILE (Pile Analysis)*</u>*: AllPile is a Windows-based analysis program that handles virtually all types of piles, including steel pipes, H-piles, pre-cast concrete piles, auger-cast piles, drilled shafts, timber piles, jetted piles, tapered piles, piers with bell, micropiles (minipiles), uplift anchors, uplift plate, and shallow foundations.*

11-   <u>*DARTIS LAB*</u>*: Dartis Lab is a geotechnical software for easily processing lab test data. Dartis Lab features Water content, Index, Specific gravity, Particle size and USCS classification of soil.*

12-   DEEPX DeepXcav: is a software program for the design of embedded earth retaining walls with limit-equilibrium and advanced non linear elastoplastic analysis methods. DeepXcav offers a one-stop complete geotechnical and structural solution for deep excavation.

13-   DEEPFND: DeepFND is a powerful interactive software for deep foundation and pile design. Axial, lateral, settlement, structural and geotechnical analysis options.

14-   Qult: Bearing Capacity analysis for shallow foundations.