Study Of Soaking on CBR Value of Soil in Chhattisgarh

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Abstract: -This study has been undertaken to investigate the determinants of stock returns in Karachi Stock Exchange (KSE) using two assets pricing models the classical Capital Asset Pricing Model and Arbitrage Pricing Theory model. To test the CAPM market return is used and macroeconomic variables are used to test the APT. The macroeconomic variables include inflation, oil prices, interest rate and exchange rate. For the very purpose monthly time series data has been arranged from Jan 2010 to Dec 2014. The analytical framework contains.

Key Words: —*Subgrade, CBR Test Compression Soaked and Unsoaked.*

I. INTRODUCTION

Damages of roads by floods are common phenomena in MP and a huge Expenditure is required almost after each flood for rehabilitation of the roads. Therefore, research aiming at finding the modes of damages to roads under flood has become necessary. Several factors may appear to be responsible for such damages, which need to be confirmed by experiments. This study aimed at determining the effects of depth of submergence and duration of submergence on the sub grade strength of soil samples collected from the Sagar-Chhatarpur National Highway's tests were performed with different heights of submergence after normal soaking period and also after prolonged submergence. Index and identification tests were performed for classification and for determination of the suitability of the studied soils as sub grade material. However, it was observed that all the three types of soils tested are rated as poor materials for sub grade according to IS soil classification systems.

Manuscript revised August 24, 2023; accepted August 25, 2023. Date of publication August 27, 2023.

This paper available online at www.ijprse.com

ISSN (Online): 2582-7898; SJIF: 5.59

Design of the various pavement layers is very much dependent on the strength of the sub grade soil over which they are going to be laid.

The present scope of work for this thesis is to ascertain the CBR value under different soaking time conditions and to study the influence, in the samples under varying soaking. 1) To collect a particular soil sample and determine its basic physical property such as LL, PL, PI and grain size distribution 2) To study the soil under modified proctor compaction and determine the MDD and OMC for the soil sample 3) To carry out CBR Test for sample soaked in different times 4) To study the influence of soaking on sub grade strength.

II. IMPORTANCE OF CBR OF SOIL SUBGRADE

The load bearing capacity of the soil supporting highways, airfield runways and other pavement systems is of immense importance to the integrity of the pavement. This loadbearing capacity, or soil stiffness, changes from time to time and can vary from place to place within a given area

The California Bearing Ratio test is to determine the CBR value for a soil under consideration as a pavement foundation. This value is a percentage comparison with the standard crushed rock from California. Thus, this test is a comparison test. The CBR value issued to quantify the response of the pavement foundation and sub grade to loading.

Soil stiffness is the degree of resistance to deformation upon loading. The extent and time dependence of, and the degree of recovery from, deformation is primarily dependent upon the soil's properties, existing stress conditions, and the stress history. Soil properties in turn are determined by a variety of complex interrelated factors, including composition particle size and particle-size distribution, weight-volume relationships, and in-situ stresses.

III. I R C Recommendations For The CBR Method Of Design

Some of the important points recommended by IRC for the CBR method of design (IRC:37– 1970) are given below:

- The CBR tests should be performed on remolded soils in the laboratory. In– Site tests are not recommended for design purpose.
- For the design of new roads, the sub grade soil sample should be compacted at OMC to proctor density whenever suitable compaction equipment is available to achieve this density in the fields; otherwise, the soil sample may be compacted to the dry density.
- In new constructions the CBR test samples may be soaked in water for four days period before testing.
- At least three samples should be tested on each 1 types of soil at the same density and moisture content.
- The top 50-cm of sub grad should be compacted at least up to 95 to 100 percent of proctor density.
- An estimate of the traffic to be carried by the road pavement at the end of expected life should be made keeping in view the existing traffic and probable growth in traffic due to change in the land use. Pavements of major roads should be designed at least for 10dayslife period and the following formula may be used in such cases for traffic prediction. $A = P(1+r)\ (n+10)$
- The traffic for the design is considered in units of heavy vehicles (of laden weight exceeding3 tons) per day in both directions and are divided into seven categories A to G.
- When sub-base course materials contain substantial proportion of aggregates of size above 20 mm, the CBR value of these materials would not be valid for the design of subsequent layers above them.

IV. Details Of Laboratory Studies

4.1 California Bearing Ratio (The Actual Laboratory Method)

The CBR test was originally developed by O.J. Porter for the California Highway Department during the 1920s. It is a load-deformation test performed in the laboratory or the field, whose results are then used with an empirical design chart to determine the thickness of flexible pavement, base, and other layers for a given vehicle loading. Though the test originated in California, the California Department of Transportation and most other highway agencies have Since abandoned the CBR method of pavement design. In the 1940s, the US Army Corps of Engineers (USACE) adopted the CBR method of design for flexible airfield pavements.

4.2 The experimental work comprises in the following parts:

4.2.1 Liquid Limit Test

This test is done to determine the liquid limit of soil as per IS: 2720 (Part 5) –1985. The liquid limit of fine-grained soil is the water content at which soil behaves practically like a liquid, but has small shear strength. Its flow closes the groove in just 25 blows in Casagrande's liquid limit device.

4.2.2 Plastic Limit Test

Plastic limit is defined as minimum water content at which soil remains in plastic state. The plasticity index is defined as the numerical difference between its Liquid limit and Plastic limit.

4.2.3 Determination of CBR of Soil

- Moulding the soil sample into standard moulds keeping its moisture content and dry density exactly same as its optimum moisture content and proctor density respectively.
- Determination of CBR strength of the respective soil samples in moulds using the CBR instrument.
- Soil sample is tested for its CBR strength after being soaked in water for 1 day, 2 days, 3 days and 4 days. Unsoaked CBR is also determined for each sample.

V. Analysis and Results

5.1. Variation of CBR with Time of Soaking (sample no. 1)

CBR Unsoaked (0 HRS.)	CBR soaked (24 Hrs.)	CBR soaked (48 Hrs.)	CBR soaked (72 Hrs.)	CBR With 4 day soaking
18.57	9.66	7.14	6.05	5.02

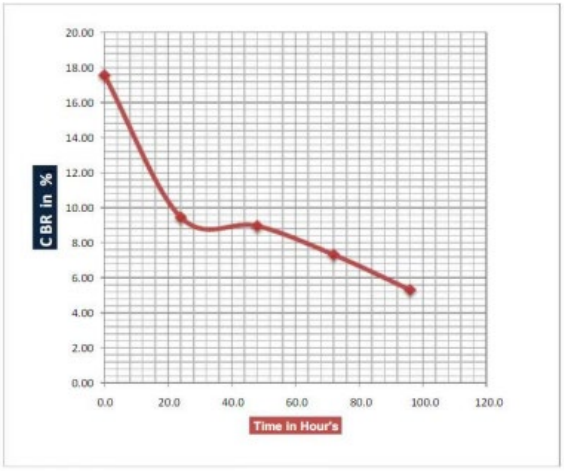

Fig.1. Variation of CBR With Time of Soaking of sample no.1

5.2. Variation of CBR with Time of Soaking (sample no. 2)

CBR Unsoaked (0 HRS.)	CBR soaked (24 Hrs.)	CBR soaked (48 Hrs.)	CBR soaked (72 Hrs.)	CBR with 4 day Soaking (90 Hrs.)
18.57	9.66	7.14	6.05	5.02

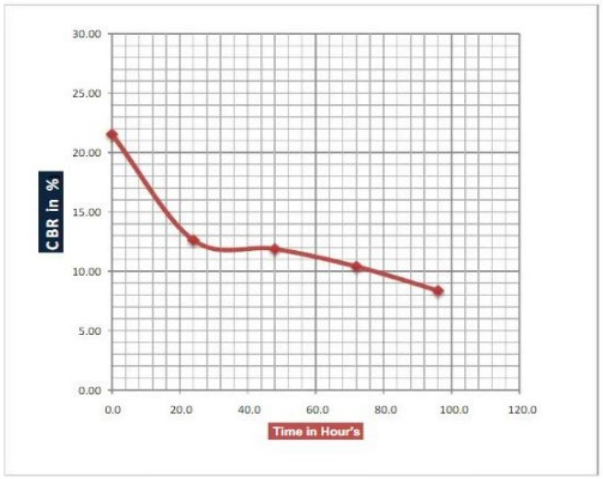

Fig.2. Variation of CBR With Time of Soaking of sample no.2

5.3. Variation of CBR with Time of Soaking (sample no. 3)

CBR Unsoaked (0 HRS.)	CBR soaked (24 Hrs.)	CBR soaked (48 Hrs.)	CBR soaked (72 Hrs.)	CBR with 4 day Soaking (90 Hrs.)
21.54	12.63	11.88	10.40	8.37

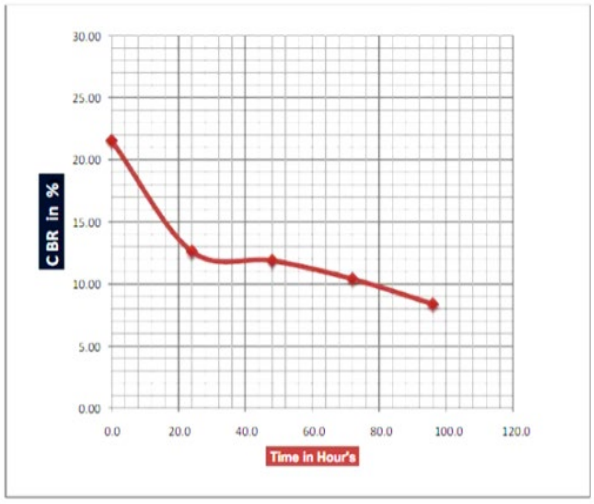

Fig.3. Variation of CBR With Time of Soaking of sample no.3

5.4. Variation of CBR with Time of Soaking (sample no. 4)

CBR Unsoaked (0 HRS.)	CBR soaked (24 Hrs.)	CBR soaked (48 Hrs.)	CBR soaked (72 Hrs.)	CBR with 4 day Soaking (90 Hrs.)
17.83	9.66	8.91	7.43	5.31

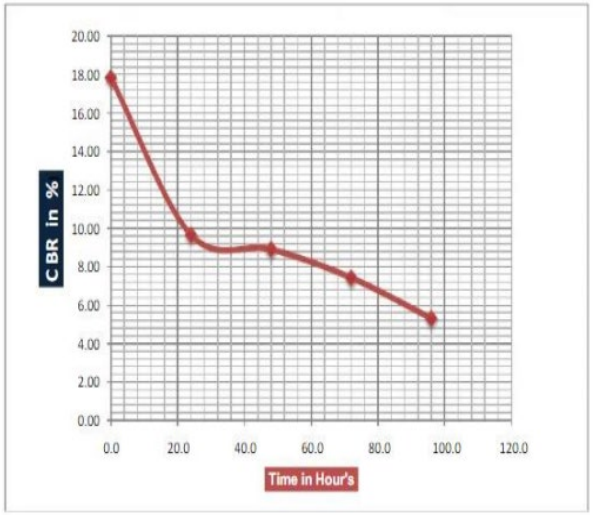

Fig.4. Variation of CBR With Time of Soaking of sample no.4

5.5. Variation of CBR with Time of Soaking (sample no. 1 to 4)

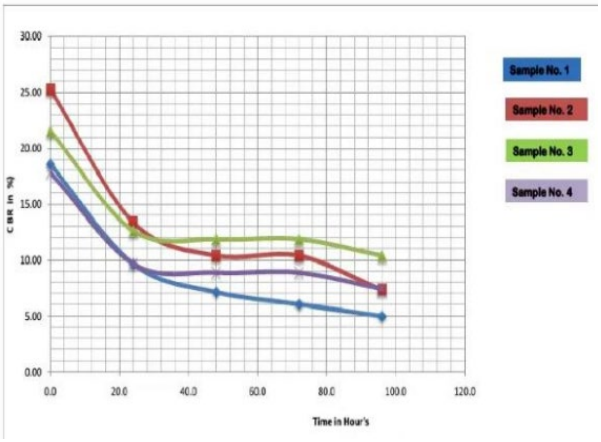

Fig.5. Variation of CBR with time of soaking of sample no 1 to 4

VI. CONCLUSIONS

From the results and discussions described earlier, it is observed that the CBR value of the given soil sample decreases rapidly with time of soaking up to 24 hrs. and then decreases slowly. When soil samples are taken from different points of the CBR sample and tested. This Study is an attempt to understand the influence of soaking on CBR value subjected to different days of soaking and the corresponding variation in moisture content. It is observed that the CBR decreases and the moisture content increases for high degree of soaking.

RECOMMANDATION

It is recommended that more studies on different type of soil prevailing in studies to be conducted involving large number of samples.

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