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GEOTECHNICAL STUDY ON SANDY SOIL WITH FIBERS

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Abstract: The soils at a given site are often less than ideal and may cause damage to structures. Soils that are encountered by the practicing engineers in the field vary widely in their properties and in their response to any external stimulus. Not all soils respond favorably under all circumstances. When soils with unfavorable characteristics are met with in the field, they have to be either discarded in total or have to be treated for the modification of their unfavorable properties so as to suit the field requirements. Accordingly a study was planned with the objective as to assess the changes in soil behavior when it's mixed with the various lengths of fibers as well as have various percentages of pond ash. Its found that As the amount of stress that can be applied on the combinations for pond ash and fibers decreases with increase of addition of pond ash and fibers, because of the decrease in cohesion.

Introduction:

In geotechnical engineering practice, the soils at a given site are often less than ideal and may cause damage to structures. Soils that are encountered by the practicing engineers in the field vary widely in their properties and in their response to any external stimulus. Not all soils respond favorably under all circumstances. When soils with unfavorable characteristics are met with in the field, they have to be either discarded in total or have to be treated for the modification of their unfavorable properties so as to suit the field requirements. The subgrade soil can be amended so as to obtain an improved soil mix by using mechanical or chemical means. The soil is made more stable by adjusting the particle size distribution. In chemical amendment, the most widely used binders are lime and Portland cement.

REVIEW OF LITERATURE

Cokca (2001) investigated upshot of Pond Ash for low strength soil. The results indicated that the plasticity index, activity and swelling potential of the samples reduces as we increase stabilizer percentage and curing time. Optimum desirable amount of pond ash in reducing the swelling potential was found to be 20%. These may be as a result of additional sludge-sized particles and due to chemical reactions that cause immediate

flocculation of clay particles and time-dependent pozzolanic and self-hardening properties of pond ash, and concluded that both high-calcium and low calcium grade C pond ash.

Various other researchers also conducted a study similar to the combinations but none of them studied together dry density as well as shear strength in one go.

MATERIALS & METHODS

The following tests and experiments were carried out to find out the following: Particle size distribution curve for soil and fly ash in ponds, yield strength of soil and its various combinations by adding a certain amount of pond ash, Proctor's test for soil and various combinations by adding and a certain specified amount of pond ash and triaxial shear test for soil and combinations by adding some specified amount of pond ash and fibers. Using the following methods – Proctor compaction test, and Triaxial Shear Stress.

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PROCTOR COMPACTION TEST

It determines optimum water content which when added a certain type of soil while being compacted gives max dry density and hence max unit weight is attained.

TRIAXIAL SHEAR TEST

This is the shear strength determining test that will give an idea whether the soil is able to bear the shear strength when subjected to a particular loading or not. In this flow of water through soil is under controlled conditions and may be measured at various stages.

Analysis of Data

The various tests conducted are shown in pictures below:

5% ash + 95% soil + 25ml water

5% ash + 95% soil + 30ml water

100% Soil + 8% water

100% Soil + 10% water

100% Soil + 12% water

100% Soil + 16% water

100% Soil + 18% water 100% Soil + 22% water

Fig.2: Proctor test done for 100% soil in laboratory

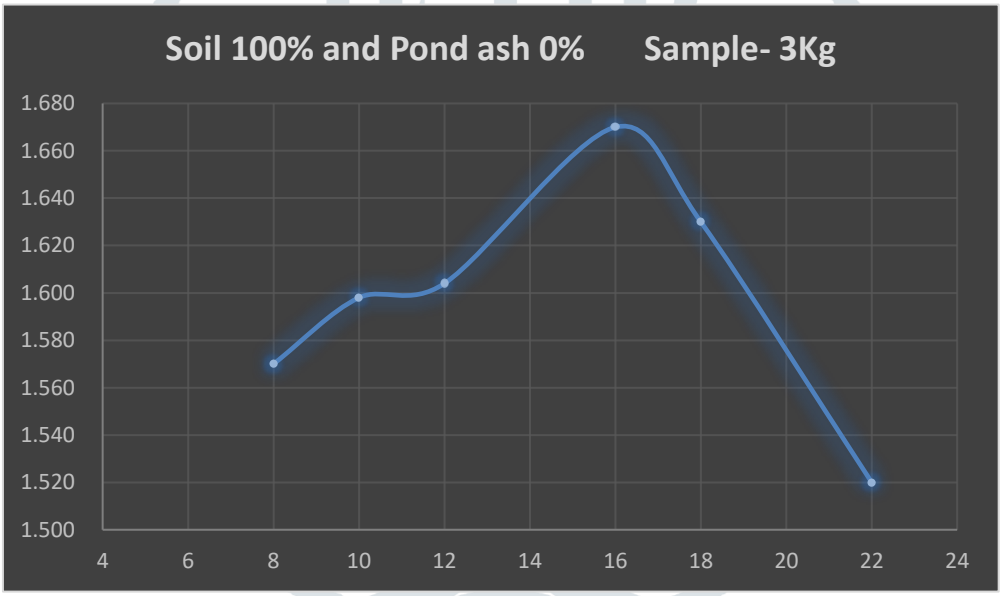

Fig.3: Proctor test data

Fig.4: Traixial testing machine

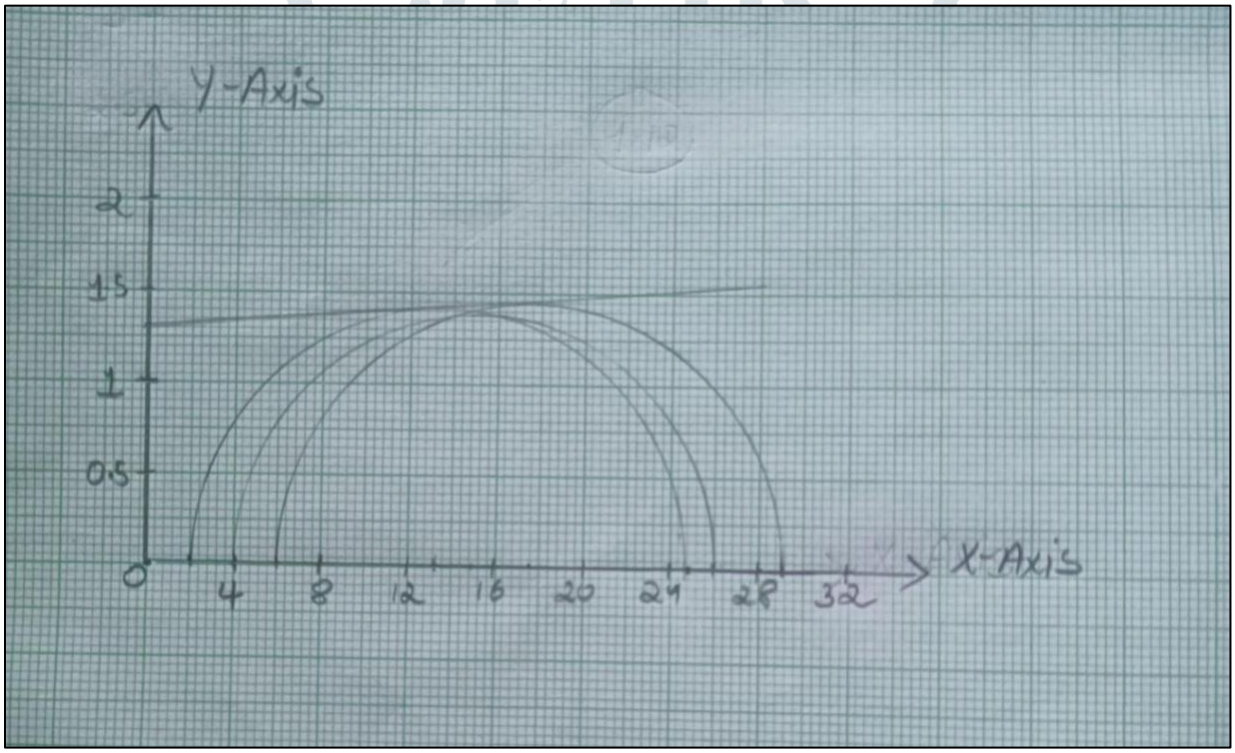

Fig.5: Graphical representation of Data for (100% Soil + 0% Pond Ash + 0% Fibre)

Table1: shear strength parameters of sandy soil

1	Confining Pressure, σ_0	2.0	4.0	6.0
2	Initial Diameter	3.8	3.8	3.8
3	Initial Length	7.6	7.6	7.6
4	Bulk Density	2.09	2.09	2.09
5	Dry Density	1.74	1.74	1.74
6	Moisture Content	16.23	16.23	16.23
7	Peak Deviator Stress	23.2	22.8	23.4
8	Failure Strain	2.3	2.6	2.5
9	Cohesion Intercept C		1.3	
10	Angle of Internal Friction		10°	

As the amount of stress that can be applied on the combinations for pond ash and fibers decreases with increase of addition of pond ash and fibers, because of the decrease in cohesion.

Conclusions: Optimum Moisture content of the Soil + Pond ash combinations increase when the amount of Pond ash increases. But the Maximum Dry Density decreases with addition of Pond ash to the soil. As the amount of stress that can be applied on the combinations for pond ash and fibers decreases with increase of addition of pond ash and fibers, because of the decrease in cohesion.

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