

Strength Characteristics of Lime-Pond Ash Treated Dredged Soil

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Abstract— Effective utilization of dredged soil from various sources will be a solution for open dumping of dredged sediments. Presence of heavy metal in untreated dredged soil will affect the soil properties and ground water contamination. Open disposal of coal combustion products like pond ash creates major environmental and health problems. This paper aims to investigate the strength characteristics of lime-pond ash treated Akkulam dredged soil. About 6% to 12% of lime and 5% to 20% of pond ash were used. From compaction tests and unconfined compressive strength tests results the optimum percentage of lime- pond ash mix is 10% and 15%. The strength properties of stabilized dredged soil are twice than that of untreated dredged soil.

Keywords- Dredged Soil; Lime- Pond Ash; Stabilization; Strength Properties

I. INTRODUCTION

Akkulam lake is one of the tourist spot in Thiruvananthapuram. As part of rejuvenation project the dredged silts were dumped near the lake shore and later it became a marshy land. Reuse of dredged sediments will be a solution for open dumping. The major waste product from coal power plants is Pond ash and its open disposal affects human health and environment too. So proper utilization of waste products will be a solution for environmental problems and also imparts to sustainable engineering applications. This study aims to evaluate the strength characteristics of treated dredged soil.

II. OBJECTIVES OF STUDY

- To find the properties of treated and untreated dredged soil.
- To stabilize dredged soil with lime and pond ash.
- To evaluate the strength characteristics of treated dredged soil.

III. MATERIALS USED

A. Dredged Soil



Fig.1. Dredged soil sample

The dredged soil sample was collected from Akkulam lake shore. The soil was dark reddish brown in colour.

B. Lime



Fig.2. Hydrated lime

Hydrated lime used in this study. The lime was in powdered form.

C. Pond Ash



Fig.3 Pond ash

Pond ash used for this study was in powdered form and it was dark grey in colour.

IV. LABORATORY TESTING

The properties of dredged soil is shown in Table I.

TABLE I. PROPERTIES OF DREDGED SOIL

Sl.No	Property	Dredged Soil
1	Specific Gravity	2.4
2	Moisture Content	43.5%
3	Percentage of silt particles	65%
4	Optimum Moisture Content	23.6
5	Maximum dry density	15.4 kN/m ³
6	Unconfined Compressive strength	31.73kPa

The dredged soil is classified as High plasticity silt.

V. RESULTS AND DISCUSSION

In order to find the properties of dredged soil, tests like hydrometer analysis, Compaction test, Unconfined compressive strength test were conducted. Test results were shown below.

Fig 4. Percentage finer graph obtained from hydrometer analysis.

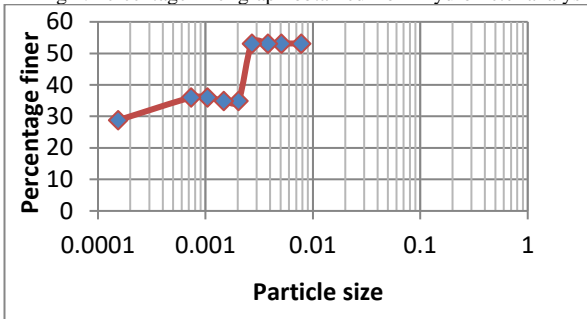


Fig 5. Unconfined Compressive Strength of lime treated soil.

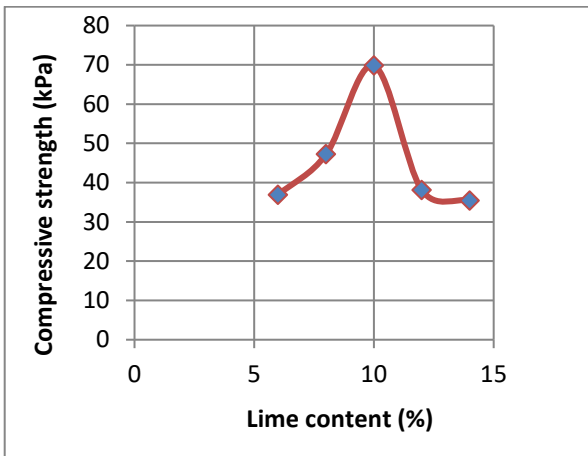
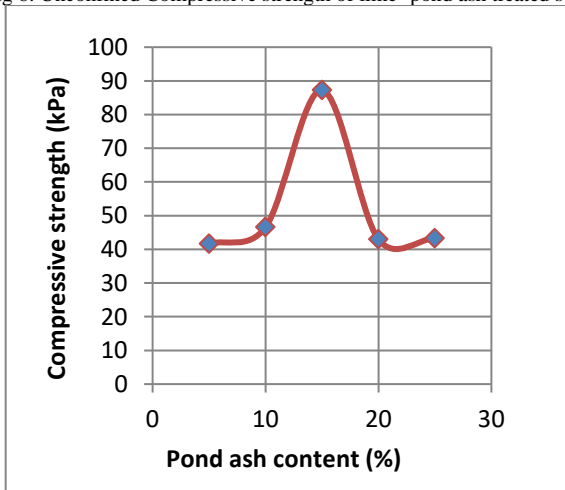


Fig 6. Unconfined Compressive strength of lime- pond ash treated soil.



CONCLUSION

The dredged soil from Akkulam lake is classified as MH. The maximum dry density and optimum moisture content of untreated dredged soil is 15.4 kN/m³ and 23.6%. In addition of 6% to 12% of lime in to soil the optimum lime percentage is 10%. Further lime addition in soil shows

decrease in unconfined compressive strength. The optimum percentage of pond ash is 15%. Further pond ash addition to dredged soil shows decrease in unconfined compressive strength. It is due to immediate reaction represented by flocculation and agglomeration.

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