EFECT OF SOAKING ON THE STRENGTH BEHAVIOUR OF SHEDI SOIL TREATED WITH NFA

H.N. Ramesh (Professor and Chairman, Dept. of Civil Engg, UVCE, Bangalore-56, Email : rheddur@gmail.com.)
H.S. Nanda (Principal, Bangalore Technological Institute, Bangalore-35, Email: rekha_nanda@yahoo.com)
K.V. Manoj Krishna (Asst.Prof., Dept. of Civil Engg., Govt. SKS JTI Bangalore-01, Email: shree_manoj@yahoo.com)

ABSTRACT: The strength property of shedi soil depends on density and compactive effort. Further the strength of weak soils can be altered by the addition of admixture. The widespread availability of fly ash has promoted its use to stabilize soils. Soils which are highly susceptible to erosion, on mixing with fly ash and curing for a sufficient period of time not only become resistant to erosion but also gain the strength. However, strength depends mainly on its reactive silica and lime content. This paper presents the strength behaviour of pozzolanic Neyveli fly ash treated with shedi soil after curing (Soaked and unsoaked). From the study it is inferred that, addition of 20% NFA to shedi soil, strength increases by 19 folds and 14 folds respectively representing for both unsoaked and soaked UCC samples compared to shedi soil alone.

INTRODUCTION
The coastal area of Karnataka has a hard crust on the top, these top layers of the laterite formations are highly porous but hard and strong. In between this top low level laterites and bottom high level laterites some of the beds are having size distribution between JEDI (clay) and GODI (silt) soils, but do not show the behaviour of the clay nor silt. These soils dissolve and flow like water when water gushes through this layer during monsoon and many times washes off the fine soil, creates cavities and at time causes heavy settlement and sliding of the top layers after the application of load. This bed soil is termed as lithomargic shedi soil [1]. The effect of soaking on the strength characteristics of lime stabilized soils had been investigated in U.K. U.S.A and India for short periods varying up to three weeks. These investigation indicate a decrease in the strength of stabilized specimen on soaking. A different trend in the strength development of black cotton soil stabilized with lime had been observed when the specimen was soaked up to one year [2].

LITERATURE REVIEW
The widespread availability of fly ash has promoted its use to stabilize soils have proved to be very effective and economical for use in base and sub-base layers of pavement systems[3]. Soils which are highly susceptible to erosion, with fly ash mixing and curing for a sufficient period of time shows not only resistant to erosion but also it gains strength [4]. So for no data is available on the effect of the fly ash content on the strength of shedi soils for different curing periods both for soaked as well unsoaked conditions. Hence, an attempt is made in this paper to study the strength of shedi soil with various percentage of fly ash for different curing periods with and without soaking.

MATERIALS USED

Shedi soil
Naturally available shedi soil was chosen for the study. The soil has been selected to reflect different mineralogical components. The soil used for the present study has been obtained from shedi gudda from a depth of 2 meter below natural ground level, Mangalore, Karnataka state, India. The geotechnical properties of Shedi soil are as follows.

Table 1. Basic properties of Shedi soil

<table>
<thead>
<tr>
<th>Type of Test</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity (G)</td>
<td>2.43</td>
</tr>
<tr>
<td>Liquid Limit (%)</td>
<td>27</td>
</tr>
<tr>
<td>Plastic Limit (%)</td>
<td>17</td>
</tr>
<tr>
<td>Plasticity Index (%)</td>
<td>10</td>
</tr>
<tr>
<td>Compaction Test Proctors M.D.D k N/m³</td>
<td>19.02</td>
</tr>
<tr>
<td>O.M.C (%)</td>
<td>13.7</td>
</tr>
<tr>
<td>Unconfined Compressive strength (kN/m²)</td>
<td>145.5</td>
</tr>
</tbody>
</table>

Neyveli Fly Ash
The fly ash used in this study was collected from Neyveli lignite corporation, Tamilnadu. It is pozzolanic fly ash belonging to the ASTM classification “A”.

METHODS
The compaction tests were conducted as per BIS 2720 [5, 6] and unconfined compressive strength test was conducted as per BIS 2720 [7]

Soaking procedure
The unconfined compressive strength samples are cured in desiccators for 3 days to get sufficient strength and then the samples are kept for soaking in distilled water for curing and tested at different curing periods.
RESULTS AND DISCUSSIONS

Optimization of NFA in Shedi soil
The unconfined compressive strength of shedi soil alone is 145 kN/m$^2$. The unconfined compressive strength was determined with the addition of Neyveli fly ash with varying percentage of Neyveli fly ash (10 to 90% by weight of soil) to shedi soil the strength increases for all the curing periods however, the increase in strength is maximum for the addition of 20% Neyveli fly ash to shedi soil. Hence 20% Neyveli fly ash has been considered to be optimum percentage.

Unconfined compressive strength test
Figure 1, shows the variation of unconfined compressive strength of Shedi soil treated with 20% Neyveli fly ash for soaked and unsoaked condition. The unconfined compressive strength of Neyveli fly ash alone for both soaked and unsoaked condition is very much higher compared to soil alone. With the addition of optimum percentage of Neyveli fly ash (20% Neyveli fly ash) the strength of Shedi soil increases with curing both for soaked and unsoaked conditions. The increase in strength with a addition of Neyveli fly ash with curing is due to the formation of Pozzolanic compounds.

CONCLUSION
Based on the experimental results following conclusions were drawn
The strength of Shedi soil increases continuously with the addition of Neyveli fly ash. However, 20% Neyveli fly ash has been chosen as the optimum percentage. The strength of Shedi soil + 20% Neyveli fly ash increases continuously for longer curing periods. The strength of Shedi soil treated with 20% Neyveli fly ash increases the strength with curing both for soaked and unsoaked conditions. However for unsoaked condition the increase is 18 folds and for soaked condition is 14 folds compared to Shedi soil alone.

REFERENCES
6. BIS: 2720 (PART-VII) Determination of moisture content and dry density.
7. BIS: 2720 (PART-X) Determination of unconfined compressive strength.