"A STUDY ON C.B.R. BEHAVIOUR OF SAND - FLY ASH - SODIUM HYDROXIDE MIXTURE"

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Abstract

Thermal power stations using pulverized coal as fuel produce enormous quantities of fly ash as waste products of combustion. Several million tons of fly ash is being produced globally everyday and its disposal presents a serious problem to the thermal power stations. In India, it is estimated that thermal power plants will produce about 100 million tons of fly ash per annum by the year 2005. Hence the problem of fly ash disposal is expected to become acute due to limited space available for its disposal. Its bulk utilization is feasible through geotechnical applications such as backfill material, sub grade preparation, embankments and the like. In the present study, effort has been made to improve the California Bearing Ratio (C.B.R.) property of river sand by adding fly ash and chemical binder namely sodium hydroxide. In the present study natural river sand and fly ash (Class C) from Neyveli Lignite Power Corporation India was used. The Basic properties of all the materials used were determined prior to testing. A total of 24 C.B.R. tests were carried out varying sand and fly ash proportions and the proportions are shown in Table 1.

Table 1. Material Proportion

Material	M_1	M_2	M_3	M_4
Sand (%)	90	80	70	60
Fly ash (%)	10	20	30	40

The variation of dry density with optimum moisture content for different mix proportions are shown in Figure 1. The sample for C.B.R. test was prepared with 90% of optimum moisture content. C.B.R. of all the mixes with and without sodium hydroxide as chemical binder was found out in the laboratory after 96 hours of soaking all the mixes. The amount of sodium hydroxide added in each mix is equal to 3% by weight of fly ash added in that mix. The increase in percentage of fly ash increases the quantity of sodium hydroxide to be added thereby resulting in higher cost. Hence taking into account the practical feasibility and the subsequent cost increase a mix of up to 40% of fly ash has been taken in this study. Experimental investigations revealed that there is a significant increase in C.B.R. with addition of sodium hydroxide to the mix. This is due to the inherent property of sodium hydroxide, which produces an increase in the pozzolanic compounds when it comes in contact with the reactive silica present in fly ash. This is because addition of sodium hydroxide increases the pH thereby increasing the solubility of silica. The gain in C.B.R. due to the addition of sodium hydroxide was found to be high enough to make it suitable for the construction of sub-grade and sub-base in road construction. On the basis of laboratory tests carried out, it is recommended that before setting up the guidelines field tests are necessary during road construction. An effort has been made to use fly ash and a chemical binder for

partial replacement of sand for road construction, which would reduce the amount of waste globally. Since the pozzolanic activity of fly ash depends on number of factors, fly ash from each batch should be tested with and without sodium hydroxide in the laboratory before suggesting the amount of fly ash and sodium hydroxide to be mixed with sand.

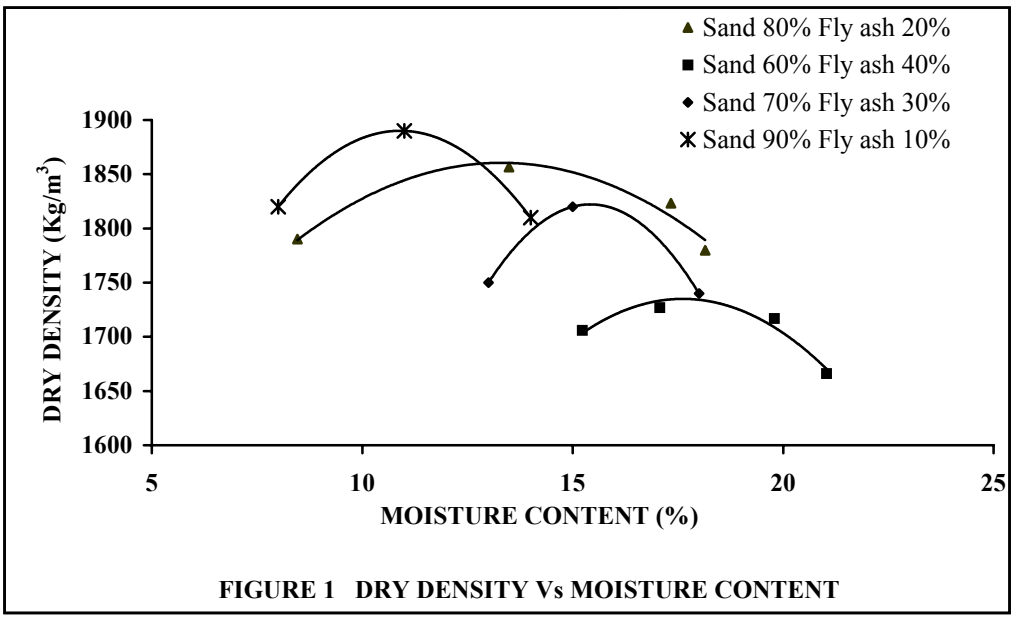

FIGURE 1 DRY DENSITY Vs MOISTURE CONTENT

Keywords: Fly ash, California Bearing Ratio, Roads, Waste material.

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