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Utilization of Hypo Sludge by Eco-Efficient Development of Rigid Pavement in Rural Roads

Prof. Jayeshkumar Pitroda¹, Dr. L.B.Zala², Dr.F.S.Umrigar³

¹Assistant Professor & Research Scholar, Civil Engg Department, B.V.M. Engineering College, Vallabh Vidyanagar.
²Head & professor, Civil Engineering Department, B.V.M. Engineering College, Vallabh Vidyanagar.
³Principal, B.V.M. Engineering College, Vallabh Vidyanagar – Gujarat – India.

Abstract— The paperproducing industry generates various wastes coming out from the various processes. From the preliminary waste named as hypo sludge, due to its low calcium is taken out to replace the cement in concrete. Major initiatives are needed in India to use these large volumes in construction industry especially in rigid pavement construction and other infrastructure projects. Moreover Use of Hypo Sludge in construction of rigid pavement will improve transportation functionality and ecological sustainability and results in improved traffic safety and reduced life-cycle cost. Use of Hypo Sludge in construction of rigid pavement will benefit urban growth, public health and surrounding communities by encouraging smart growth by integrating and guiding future growth. It is also needed to reduce the cost of concrete pavement for rural development in India. So our study is concerned with eco-efficient utilization of Hypo sludge as partial replacement of cement in concrete for development of low cost rigid pavement of rural road infrastructure. The Hypo sludge was replaced within the range of 10–40% by weight of cement. In the present study, 5 different mixes of Hypo Sludge are tested for parameters like: compressive strength, flexural strength and cost.

environment-friendly road infrastructure for low-volume rural roads.

It has been observed that it would be economical to use industrial wastes in the construction of low volume rural roads.

Paper mill sludge is a major economic and environmental problem for the paper and board industry. The material is a by-product of the de-inking and de-pulping of paper. The million tonnes quantity of paper mill sludge produced in the world. The main recycling and disposal routes for paper sludge are land-spreading as agricultural fertiliser, producing paper sludge ash, or disposal to landfill. In functional terms, paper sludge consists of cellulose fibres, calcium carbonate and china clay and residual chemicals bound up with water. The material is viscous, sticky and hard to dry. To produce low cost concrete by blending various ratios of cement with hypo sludge and to reduce disposal and pollution problems due to hypo sludge it is most essential to develop profitable building materials from hypo sludge. To make good quality paper limited number of times recycled Paper fibres can be used which produces a large amount of solid waste. The innovative use of hypo sludge in concrete formulations as a supplementary cementitious material was tested as an alternative to conventional concrete.

Keywords : Hypo sludge, Eco-efficient, Concrete, Rigid Pavement, Rural Development, Low Cost Roads

1 INTRODUCTION

Rural Infrastructure is the key to inclusive growth by connecting the rural hinterlands and enabling the roll out of many additional socio-economic sciences. With a growing rural road network of the country and with ambitious rural road development plans, there is a great need for the roads sector to build a sustainable and

II EXPERIMENTAL WORK

a) *Chemical Properties of Ordinary Portland Cement (OPC) and Hypo sludge:*

It is Chemical Properties of Ordinary Portland Cement (OPC) and Hypo sludgeas listed in Table 1:

TABLE I
**CHEMICAL PROPERTIES OF ORDINARY
 PORTLAND CEMENT (OPC) AND HYPO
 SLUDGE**

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