A REVIEW PAPER ON PERMEABLE CONCRETE AS A ROAD PAVEMENT

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Abstract – *At many projects water logging at highway and parking is the major issue especially during monsoon as pavements and floors are normally impermeable. This results in considerable amount of investment in repairs and providing storm water drain systems, which may get clogged during peak over flow. Besides this there are many other problems that arise due to the above. In such situations it is very important to think about an economical solution which helps in getting rid of all above problems. The best solution to above problem is permeable concrete. These papers summarize the various studies which have been carried out to fulfill the requirement of permeable concrete.*

***Key Words*: Permeable concrete as a road pavement**

1. INTRODUCTION

India is a developing country and safety of roads is still in a Pervious concrete pavement is a unique and effective means to address important environmental issues and support green, sustainable growth. By capturing storm water and allowing it to seep into the ground, porous concrete is instrumental in recharging groundwater, reducing storm water runoff. This pavement technology creates more efficient land use by eliminating the need for retention ponds, swales, and other storm water management devices. In doing so, pervious concrete has the ability to lower overall project costs on a first-cost basis.

In pervious concrete, carefully controlled amounts of water and cement materials are used to create a paste that forms a thick coating around aggregate particles. A pervious concrete mixture contains little or no sand, creating a substantial void content. Using sufficient paste to coat and bind the aggregate particles together creates a system of highly permeable, interconnected voids that drain quickly. Typically, between 15% and 25% voids are achieved in the hardened concrete Permeable concrete pavements are use mostly in rural area. This concept of pervious concrete is relatively new for rural road pavement. Pervious concrete has ability to flow water through it .

And this property help to recharge the ground water. Pervious concrete pavement is unique and effective technique to meet the future demand. Strength of the pervious concrete is low as compared to conventional concrete it is all due to high porosity.

This dissertation analyses the effectiveness of Permeable concrete in pavement. This was achieved by analyzing the properties and characteristics of Permeable concrete. The performance of Permeable concrete was compared with a concrete sample that is comparable to the material used for the construction of conventional concrete road pavements. Permeable concrete is mostly used in non-pavements applications, limited use in pavements applications. This is to assess the suitability for Permeable concrete to be used for the construction of road pavement.

The tests conducted to determine the fresh concrete properties were the slump test and compacting factor tests. These were complimented by hardened concrete tests including the following: compressive strength, indirect tensile strength. After that there is a comparisons are made between the both type of concrete.

It was found that Permeable concrete pavements possess some positive features like increased skid resistance and high permeability but lacks the high strength required for highly traffic areas. Permeable concrete has proven to have properties suitable for use in low volume traffic areas. The properties found may change depending on the aggregate particle chosen, however this aspect requires further investigation. Nonetheless, if Permeable concrete pavements can be implemented, it will have numerous positive effects on the environment.

LITERATURE REVIEW

Malhotra (1976), found that the density of permeable concrete is generally about 70 percent of conventional concrete when made with similar constituents. The density of permeable concrete using conventional aggregates varies from 1602 to 1922 kg/m^3.

Adequate vibration is imperative for strength of conventional concrete. The use of permeable concrete is different and is a self-packing product. Malhotra (1976) suggests that the use of mechanical vibrators and ramming is not recommended with permeable concrete. A light rodding should be adequate and used to ensure that the concrete reaches all sections of the formwork. This is not a problem with conventional concrete since it has greater flow ability than permeable concrete. The light rodding ensures that the concrete has penetrated all the areas impeded by reinforcing steel.

Malhotra stresses that in situations where normal conditions are not achieved during placement and curing, the formwork should not be removed after 24 hours as with conventional concrete. Permeable concrete has very low cohesiveness and formwork should remain until the cement paste has hardened sufficiently to hold the aggregate particles together. However, this is more of a consideration in low temperature conditions and when used in non-pavement applications where the concrete is not sufficiently supported by the ground or other means.

Ghafoori et al (1995), undertook a considerable amount of laboratory investigation to determine the effectiveness of permeable concrete as a paving material. The curing types were investigated to determine if there was any difference between wet and sealed curing. There appeared to be only a negligible difference in strength between the different curing methods. It was clear from the test results that the strength development of permeable concrete was not dependent upon the curing conditions.

The indirect tensile test conducted by Ghafoori et al found that the sample tests varied between 1.22 and 2.83 MPa. The greater tensile strength was achieved with a lower aggregate-cement ratio. Ghafoori et al (1995) explained the more favorable properties obtained by the lower aggregate-cement ratio by an improved mechanical interlocking behavior between the aggregateparticles.

Ghafoori et al produced permeable concrete with a compressive strength in excess of 20 MPa when using an aggregate-cement ratio of4:1.

Abadjieva et al (1997), determined that the compressive strength of permeable concrete increases with age at a similar rate to conventional concrete. The permeable concrete specimens tested had aggregate-cement ratios varying from 6:1 to 10:1. The 28 day compressive strength obtained by these mixes ranged from 1.1 and 8.2 MPa, with the aggregate-cement ratio of 6:1 being the strongest. He concluded the most plausible explanation for the reduced strength was caused by the increased porosity of the concrete samples. This strength is sufficient for structural load bearing walls and associate applications.

Objectives of the Proposed work

The objectives of the work would be:

(i) To determine the durability, properties of permeable concrete.

(ii) To determine the impact resistant of permeable concrete pavement.

(iii) To compare the properties of permeable concrete with the existing concrete pavement.

FUTURE SCOPE

We can use 25 mm aggregate size for future study or analysis. Pervious concrete is a special type of concrete with a high porosity used for concrete pavement applications that allows water from precipitation and other sources to pass directly through it, thereby reducing the runoff from a site and allowing groundwater recharge.

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