DESIGN AND FABRICATION OF PERMEABLE PAVEMENT MODEL TO ANALYSE ITS APPLICABILITY FOR HEAVY RAINFALL ROADS AND PARKING LOTS

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Introduction: Pervious concrete is a special type of concrete, which consists of cement, coarse aggregates, water and if required, admixtures and other cementitious materials. As there are no fine aggregates used in the concrete matrix, the void content is more which allows the water flow through its body. So the pervious concrete is also called as permeable concrete. The compressive strength of pervious concrete is less when compared to conventional concrete due to its porosity and voids. Hence the usage of pervious concrete is limited even though it has lot of advantages. If the compressive strength and flexural strength of pervious concrete is increased, then it can be used for more number of applications. For now, the usage of pervious concrete is mostly limited to light traffic roads only. If the properties are improved, then it can also be used for medium and heavy traffic rigid pavements also. Along with that, the pervious concrete eliminates surface runoff of storm water, facilitates the ground water recharge and makes the effective usage of available land. In this project investigation, an attempt is made without altering the permeable nature of the pavement.

Objective:
1. To design and fabricate permeable pavement model for rapid discharge of water.
2. To characterize pavement model as its applicability to heavy rainfall roads and parking lots.

Methodology:
1. Collection of materials: - Various material for the construction of permeable pavement was collected. Aggregates, cement, glass fibres, SBR latex, geo grid and geo textile were collected for the testing and construction of the permeable pavement
2. Testing of materials as its suitability to permeable pavement: - The collection of materials was followed by testing of materials for its suitability to permeable pavement. The tests on aggregate include hardness test, toughness test, flakiness and elongation and
so on. Normal consistency, initial setting time and final setting time tests were conducted on cement.

3. **Design of permeable pavement model to enhance rapid discharge in the pavement**:
   Permeability, compression and flexural tests were conducted on various pervious blocks were conducted. The pervious blocks were constructed with different percentage of glass fibres and geo grid were placed at various depths in the blocks. Using the values of optimum block, thickness of permeable pavement was determined using IRC 58-2002.

4. **Calculation of quantity of material required to fabricate permeable pavement model**:
   After the design of the pavement, the quantity of materials required to construct the permeable pavement model is calculated by Quantity Analysis.

5. **Fabrication of the model**:
   On the basis of the design, the permeable pavement model is constructed.

6. **Analysis of the model as its applicability to heavy Rainfall roads and parking lots**:
   According to the test results, Analysis of permeable pavement is carried out for heavy rainfall areas. The strength and permeability of permeable pavement was compared with impervious concrete for its application in heavy rainfall areas.

**Brief Discussion of Results and Conclusion:**

1. Results show that 10mm passing and 4.75mm retained aggregate with 10% of SBR latex, 0.4% of glass fibre, and placing the geo grid at the middle of pavement design gave flexural strength of 8.87 MPa which is higher than the prescribed value of 4.5 MPa by IRC 58-2002.

2. Compressive strength achieved for optimum dosage was found to be 35.81 Mpa.

3. Normal discharge of pavement was found from the previous studies that 0.0027 cm/sec and 1.5 cm/sec for permeable pavement. In the current investigation it has found that discharge of 4 cm/sec is achieved.

4. Since discharge rate is 4 cm/sec this pavement easily can be adopted in heavy rainfall areas and parking lots.

**Scope for future work:**

1. It is recommended that more research is required on design of suitable drainage system in connection with direct usage of drain water for domestic, agricultural and industrial use.