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## RECHARGING GROUND WATER TABLE BY USING PERMEABLE PAVER BLOCKS

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### ABSTRACT

In India, the ground water table is decreasing at a faster rate due to reduction in ground water recharge. These days, the vegetation cover is replaced by infrastructure hence the water gets very less opportunity to infiltrate itself into the soil. The permeable paver blocks has a high porosity so permeable paver blocks can be used in walking tracks, parking lots, etc. then it can reduce the runoff from the site and help in the ground water recharge. Such type of smart materials will play an important role for Indian conditions where government is putting lot of efforts to implement ground water recharging techniques. after studying the various topographical features, the traffic intensity and the rainfall for that particular area, the concrete was designed and tested for the different proportion and thus the mix design for the permeable paver blocks was finalized based upon its permeability and strength characteristics. Permeable paver blocks consist of cement, coarse aggregate and water. Thus, basically Pervious concrete is not concrete but it is a mortar where, instead of fine aggregate, coarse aggregates are used. But as the properties resemble with concrete in mould it is called "permeable paver blocks". The absence of fine aggregates in the mix creates voids in the porous structure which allow water and air to pass through the mass. As the concrete is porous its strength gets reduced. Paving blocks are basically permeable pavements, which can reduce surface runoff by infiltrate rainwater into the ground. So that the installation of paving blocks on parking lots has an environmental function for filling groundwater.

**Keywords:** permeable paver blocks, sub-surface infiltration , run-off

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### I. INTRODUCTION

In India, the ground water table is decreasing at a faster rate due to reduction in ground water recharge. These days, the vegetation cover is replaced by infrastructure hence the water gets very less opportunity to infiltrate itself into the soil. The permeable paver blocks has a high porosity so permeable paver blocks can be used in walking tracks, parking lots, etc. then it can reduce the runoff from the site and help in the ground water recharge. Such type of smart materials will play an important role for Indian conditions where government is putting lot of efforts to implement ground water recharging techniques. During the research work, the runoff for a particular storm was calculated for a bitumen pavement on a sloping ground. Later after studying the various topographical features, the traffic intensity and the rainfall for that particular area, the concrete was designed and tested for the different proportion and thus the mix design for the permeable paver blocks was finalized based upon its permeability and strength characteristics. Later by using this permeable concrete the infiltration and runoff for the same storm was compared and studied. One of the method is to construct Pervious Concrete Pavement. For preparing pervious pavement, aggregates of different sizes, like 2.36 to 10 mm (coarse sand), 4.75 mm to 12.5 mm (grit) and 4.75 to 20 mm (coarse aggregates) were used. Therefore, for preparing permeable paver blocks coarse aggregate of range 4.75 to 12.5mm (grit) were used. Proportion of aggregates and cement is 1:3 and tried to find best combination. The specimens prepared with grit and cement is tested for compressive strength gives good result as compared to other combinations. Pervious concrete not only reduce storm water but also help in rising ground water level by artificial recharging. Permeable paver blocks consist of cement, coarse aggregate and water. Thus, basically Pervious concrete is not concrete but it is a mortar where, instead of fine aggregate, coarse aggregates are used. But as the properties resemble with concrete in mould it is called "permeable paver blocks". The absence of fine aggregates in the mix creates voids in the porous structure which allow water and air to pass through the mass. As the concrete is porous its strength gets reduced.

## II. METHODOLOGY

### Collection of material

1. **Cement:** Ordinary Portland cement of grade M43 is used.
2. **Aggregate:** Coarse sand of size 2.36 to 10 mm and Grit of size 4.75 to 12.5 mm are used.
3. **Water:** Tap Water is used.

### Procedure

The ingredients are taken as per weight mix. The proportion of 1:3 is used, where one part of cement and three part of aggregates. The water-cement Ratio is 30 %. At a time six number of cubes are casted, taking in to consideration of compressive strength test at the end of 7 days and 14 days. Total 12 cubes are casted with two different combinations of aggregates. The size of cube is 150 mm x 150 mm x 150 mm. The aggregates used as per following Table No.1

**TABLE NO.1 Size And Symbol Of Aggregates**

Sr.no.	Aggregate	Size
1	Coarse Sand	2.36 to 10 mm
2	Grit	4.75 to 12.5 mm

After 24 Hours of casting moulds were removed and kept in water tank for curing. Sample cubes are tested for compressive strength on CTM. The ultimate load on which cube breaks is noted. This ultimate load divided by surface area of cube, gives compressive strength of cube.



## III. MODELING AND ANALYSIS



**Figure 1:** Permeable cube

#### IV. RESULTS AND DISCUSSION

**TABLE NO.2 :** Compressive strength for coarse sand mix at 14 days

Sr. No.	Sample	Load in N	Area in mm <sup>2</sup>	Comp. strength Load/ Area N/mm <sup>2</sup>	Avg. Comp. Strength N/mm <sup>2</sup>
1	1	105000	150 x 150	4.67	4.44
2	2	100000	150 x 150	4.44	
3	3	95000	150 x 150	4.22	

**TABLE NO.3 :** Compressive strength for Grit mix at 14 days

Sr. No.	Sample	Load in N	Area in mm <sup>2</sup>	Comp. strength Load/ Area N/mm <sup>2</sup>	Avg. Comp. Strength N/mm <sup>2</sup>
1	4	255000	150 x 150	11.33	11.70
2	5	260000	150 x 150	11.55	
3	6	275000	150 x 150	12.22	

#### V. CONCLUSION

1. Pervious concrete with coarse aggregate size 4.75mm to 12.5 mm (grit) mix has good compressive strength as compared to Coarse sand of size 2.36mm to 10mm concrete mix.
2. From this result, it is observed that this compressive strength of pervious concrete is not desirable for heavy traffic load so it is used at place where traffic is lighter.
3. The percolation of water through pervious concrete can increased the recharge of ground water. Therefore pervious paver blocks are used in parking lots, foot-paths , shoulder, sidewalks, Tennis courts, Tree grate, Swimming pool decks, garden walkway and Pavement edge drains.

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