

# **Analysis and Design of Road to Prevent Water Logging in Vimeet Campus**

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## **ABSTRACT**

Permeable concrete is one of the modern technologies. Permeable concrete is an innovative approach to control, manage and treat the storm water runoff. Permeable concrete is the special type of concrete which contains interconnected voids and these voids or pores allows storm and rain water to percolate underground through it. Thus, permeable concrete is the best way to solve or minimize problems like water logging, low ground water table, etc. Permeable concrete mostly used as a artifact but it also may use for various purpose aside from pavement like parking areas, court , fish hatcheries, zoos, noise barriers, slope stabilization etc. Methodology to be followed and procedure for various tests to be carried out are mentioned, the test methods adopted to determine the

properties of materials such as aggregate are impact test, flakiness index and elongation index, relative density and water absorption of aggregate.

Properties of fresh and hardened concrete are Slump Cone Test, Compression Test, Flexural test

Keywords: Permeable concrete, internal curing, compressive strength, Flexural strength.

## **1. INTRODUCTION**

Permeable concrete is an environmentally friendly and sustainable infrastructure with benefits such as storm water reduction, river peak flow rate reduction, groundwater recharge, pollutant abatement, heat island mitigation, noise reduction, and skid reduction. Typical applications of permeable concrete pavements include

vehicle parking areas, sidewalks, pathways, driveways, and alleys. Permeable concrete allows rainfall to be drained and to percolate through the concrete to the subgrade materials, thereby reducing storm water runoff and, at an equivalent time, recharging the groundwater. Slump values are usually less than 20 mm. The range of porosity that's commonly reported for permeable concrete is 15 to 30% and this relies on the compaction method adopted. The permeability of permeable concrete varies from 120litres/m<sup>2</sup>/min to 320litres/m<sup>2</sup>/min. However, the strength of the fabric is comparatively low due to its porosity. The compressive strength of the fabric can only reach about 20 to 30MPa. The flexural strength of permeable concrete varies from 1 Mpa to 28 Mpa. The density of aggregates used for permeable concrete varies from 1600 kg/m<sup>3</sup> to 2000 kg/m<sup>3</sup>.

### **1.1 ADVANTAGES OF PERMEABLE CONCRETE PAVEMENTS**

Concrete with high porosity used for horizontal concrete surface that allows water to pass through.

- Unique surface finish and enhance traction provides better skids resistance to light traffic at the time of rainfall.
- Reduce development cost with smaller capacity of storm water drainage and water harvesting arrangements.
- The permeable concrete pavement material has holes that can collect heat such

pavement can adjust the temperature and humidity of the earth surface. It also reduces heat island effect.

- It improves water quality and helps in ground water recharge
- It reduces the need for big infrastructures for water storage and reduces the overall cost.
- Since permeable pavements are available in various sizes, designs and colors it can complement any architectural design or concepts.
- The permeable concrete pavements can absorb the noise of vehicles which create silent and comfortable environment

### **1.2 DISADVANTAGES OF PERMEABLE CONCRETE PAVEMENTS**

While this pavement is a superb option surely situations, it's going to not always be a viable choice. Because permeable concrete features a rough textured, honeycombed surface, moderate amounts of surface raveling are normal. This can be a drag on traveled roadways.

- The main reason permeable concrete is not used for high traffic pavements, such as highways, is surface raveling.
- The maintenance requirements of permeable pavements are quite difficult.
- It's susceptible to clogging if the water within the reservoir isn't drain out properly the sand and fine particles which will block the space between the pavers must be

removed using an industrial vacuum it can ever clog when you sand for ice burning the winter. If you do not cater to clogging quickly it will cause the water and pollutants to run off the surface, defecting the purpose of installing permeable pavements.

## **2. LITERATURE SURVEY**

**Terry Luckel, Jo Divine et al. [2017]**

Altering the natural characteristics of a drainage basin through urbanization can impose dramatic changes on the movement and storage of water within the catchment. As permeable pavements are specifically designed to promote the infiltration of storm water through the paving and structure they can be used to promote infiltration and groundwater recharge, while decreasing storm water runoff volumes and flow rates from the catchment. The use of permeable pavements can result in many storm water management and environmental benefits.

**Kevern J.T., Schaefer R et al. [2009]**

studied the present methods of curing permeable concrete is to hide with plastic for 7 days, although no studies are performed to work out if that's sufficient or even required. They presented results of combinations of 4 different permeable concrete mixtures cured using six common curing methods. The surface abrasion of the concrete was tested employing a rotary cutter device consistent with ASTM C944.

The results show that the concrete abrasion resistance was improved with a majority surface applied curing compounds; however, the surfaces covered with plastic sheets produced rock bottom abrasion levels. A majority of the curing regimes also produced higher flexural strength than the control concrete. The best abrasion resistance and better strength overall was obtained with the mixture containing ash and cured under plastic for 28 days.

## **3. METHODOLOGY**

**Setup a Benchmark [BM]:.** This previous data of benchmark are often acquired from previous surveys. Benchmark data is typically found on churches, govt buildings, municipal offices, railroad station boards, etc

**Location and Position of Dumpy level:**

Select an area where you've got a transparent sight of the benchmark. It is recommended to line up the instrument within the centre of the land where you'll see all the location including benchmark.

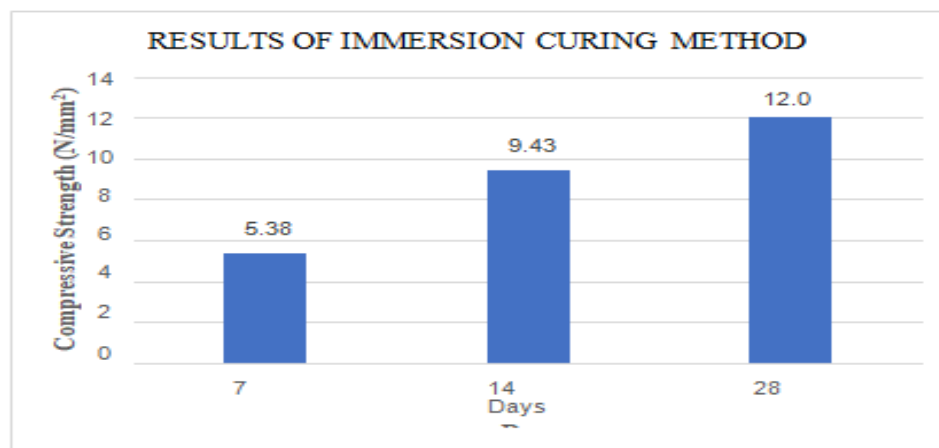
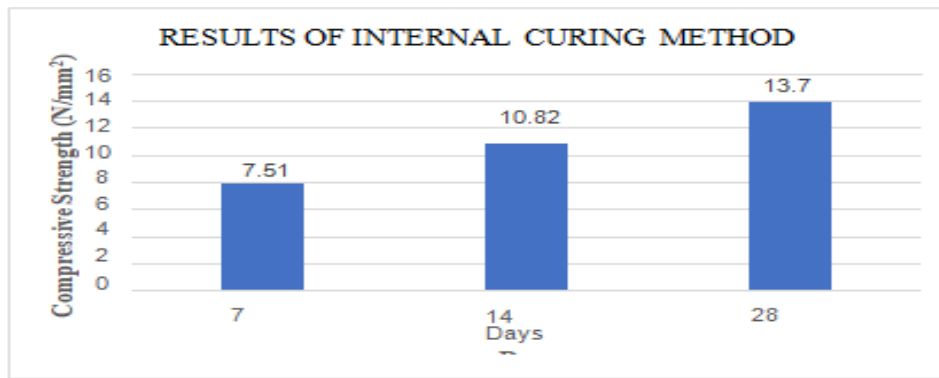
**Setting up Dumpy level on Tripod:**

The Tripod has got to be placed firmly on the bottom in order that it can efficiently hold the Dumpy level. One must make sure the legs of the tripod stand are wide enough to carry the instrument properly and legs are properly inserted into the bottom. One must make sure that the device is tightly fixed with a tripod. Since the extent head is extremely sensitive, and therefore the

Chainage	d	b	bd	S	sd <sup>2</sup>	bd+sd <sup>2</sup>	Am	L	Q	
									C	F
0	1	4	4	1.2	1.2	5.2	0	10	0	0
10	1.515	4	6.06	1.2	3.636	9.696	7.448	10	0	74.48
20	1.235	4	4.94	1.2	2.964	7.904	8.8	10	0	88
30	1.22	4	4.88	1.2	2.928	7.808	7.856	10	0	78.56
40	1.11	4	4.44	1.2	2.664	7.104	7.456	10	0	74.56
50	1.1	4	4.4	1.2	2.64	7.04	7.072	10	0	70.72
60	0.675	4	2.7	1.2	1.62	4.32	5.68	10	0	56.8
70	0.425	4	1.7	1.2	1.02	2.72	3.52	10	0	35.2
80	0.485	4	1.94	1.2	1.164	3.104	2.912	10	0	29.12
90	0.695	4	2.78	1.2	1.668	4.448	3.776	10	0	37.76
100	0.9	4	3.6	1.2	2.16	5.76	5.104	10	0	51.04
									Total =	596.24

Total amount =rs 208684  
 3% contingency=rs6260  
 2% establishment=rs4173  
 grand total  
 =rs219117

instrument is extremely costly, special care should be taken while handling it. To work efficiently, the Dumpy level must behold within the complete horizontal direction. Foot screws Levelling screws might be wont to set a levelled condition



#### 4. CONSTRUCTION AND MAINTENANCE

Pervious concrete is conveyed to the jobsite by ordinary readymix trucks and put inside standard shapes. Since pervious concrete is thicker in consistency than customary concrete, a vibrating mechanical screed is utilized to level it off. Vibration is taken after by compaction with a overwhelming steel roller to achieve more prominent quality. Since pervious concrete contains a moo water substance, curing is particularly basic. After placement, the concrete is moistened with water and after that secured

with plastic sheeting and kept moist for at slightest 7 days to permit full hydration of the cement. Often clearing groups can total pervious concrete jobs quicker than when introducing normal concrete. That's since pervious concrete doesn't ought to be worked with a bull drift or trowel, since these wrapping up operations can seal off the asphalt surface and diminish water penetration. To avoid decrease in porousness, pervious concrete must be cleaned routinely

## 5. CONCLUSION

This report describes about the mix design of permeable concrete, permeable concrete pavement and its types, needs and its present applications. This report also looked at various literature reviews and studies conducted on permeable concrete mix designs and permeable concrete pavement systems. The water quality and life span aspects were outlined for permeable pavement systems. Also, the different methods used for curing that are, internal curing method and immersion curing are also stated and test results regarding both the curing methods are briefly outlined in the report. Different sizes of aggregate and W/C ratio and also the amount of admixture gives us different test results. We got following results for our objectives

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