7th National Conference on
"Role of Engineers in Nation Building" organized by VIVA Institute of Technology, Mumbai
(1st and 2nd March 2019)
International Journal of Engineering Research & Science (IJOER)
ISBN: [978-93-5321-411-1] ISSN: [2395-6992] [Vol-5, Issue-3, March- 2019]

Permeable Concrete Pavement

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Abstract**—***The social, economic, cultural and industrial growth of any country depends heavily on its transportation system. The only mode which could give maximum service to one and all in transportation is by highways and railways. Majorly adopted mode of transportation is roadway in our country which is also used for the purpose of supplies for defense. Roadways are integral part of our society in every aspect but nowadays we have been facing problem road transportation system due to improper road network and improper maintenance of road. Use of permeable concrete pavement in place of conventionally used asphalt pavement can reduce the surface water run-off and can also enhance ground water quality and quantity. Moreover it can reduce the problems related to water logging and ground water pollution. It can be effectively used in underground parking system, well lining and etc. it also gives high filtration and flow rate as compared to conventional pavement.*

Keywords— Permeability, Run-off, Water logging.

I. INTRODUCTION

Climatic conditions also affect the roads and thereby creating problem for transportation. In rainy season we have been facing problems arising due to water logging and improper drainage of water from road surface which is because of the specific characteristics of bitumen which is resistant to water percolation through it. Sometimes water logging is hazardous and even costs life due accidents and also affects our day to day life. Water logging is observed due to the use of conventional material for the construction of pavement such as bitumen aggregate and etc. which are non-porous in nature. Conventional materials are readily available but they create load on the environment as the materials used for construction base course are excavated from mountains which further also affects the ground water quality and quantity. Reduced ground water table also leads to water scarcity inurban areas summer season and imparts load on water distribution system. Reduced water table also affects irrigation water demand and affects the agricultural growth of a nation.To avoid such problems the conventional pavement material should be replaced with the modern techniques of construction of pavement which allow water to percolate through them and thereby avoiding water logging and subsequent increase in water table.

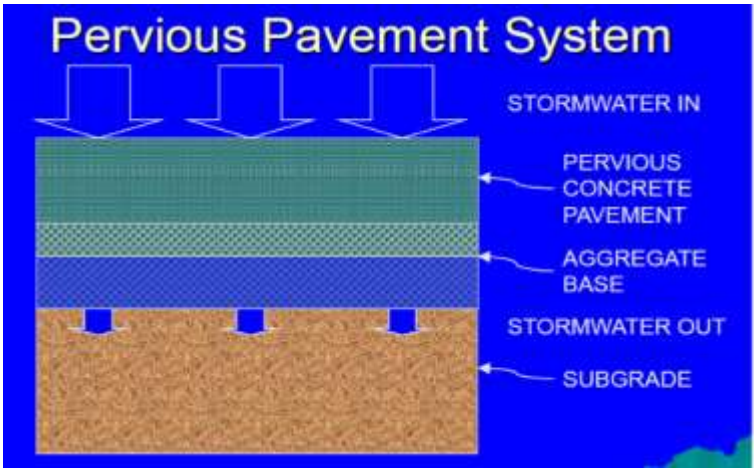

Fig. No. 1 Typical Cross Section Showing Layers Of Pervious Pavement System

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II. LITERATURE SURVEY

Before continuing for any project literature survey needs to be in deep trouble the steering of planned work. For ground improvement techniques we tend to had collected twenty one science journals and analysis papers these papers facilitate us to control the info and suggestion of best methodology to use on chosen web site.

In [3] it shows elaborated study and analysis of 4 sites visited by the author. Previous analysis has found permeable pavements to be effective in reducing runoff and associated pollutants for alternative areas round the United States. Water quality results from this study appear to support previous analysis that permeable pavements will scale back Zn (Zn). They need performed range of tests as well as runoff depth analysis and water quality.

In [4] this evaluates the properties of receptive concrete fabricated from high-calcium ash geopolymer binder. So as to expand the employment of ash geopolymer binder, geopolymer receptive concretes (GPCs) were ready from alkali activated hamates high-calcium ash binder and coarse combination. The void content, water porosity, compressive strength, and cacophonic durability of PGCs were determined. The compressive strengths between five.4 and 11.4 MPa and split tensile strengths between zero.7 and 1.4 MPa were obtained. During this paper the relationships of the density-void content, compressive strength, density, and compressive strength-void content of the PGCs were derived and located to be like those of standard receptive concrete.

In [5] its purpose is to review paper is to summarise the wide-range permeable pavement systems. It highlights weight current trends in analysis and business, and to suggest future areas of analysis and development. The event of PPS as associate degree integral a part of property emptying systems is reviewed within the context of ancient and fashionable urban emptying. The newest innovations as highlighted and explained their potential for more analysis work is printed.

In [6] receptive concrete has been progressively accustomed scale back the quantity of runoff water and improve the water quality close to pavements and parking heaps. However, because of the considerably reduced strength related to the high consistence, receptive concrete mixtures presently cannot be employed in main road pavement structures. The take a look at results indicate that it had been potential to provide receptive concrete mixture with acceptable porosity and strength through the mix of latex and sand. This study targeted on the balance between porosity and strength properties of polymer-modified receptive concrete.

In [7] it presents the results of experimental investigations on the prestigious factors on the strengths and porosity of porous concrete. As 2 necessary characteristics, the strength is reciprocally proportional to the porosity, a series of experiments are conducted for exploring the optimum combine style. Permeable pavement, because of its high consistence and porosity, is taken into account as an alternate to ancient fast laborious pavements for dominant storm water in a cost-effective and friendly environmental approach.

In [8] this study examined the long-run effectiveness of permeable pavement as an alternate to ancient fast asphalt pavement in a very car park. Four commercially on the market permeable pavement systems were evaluated when six years of daily parking usage for structural sturdiness, ability to infiltrate precipitation, and impacts on infiltrate water quality. And it's shown its performance beneath operating load of vehicles employed in this four parking's fabricated from permeable pavement for the length of six years.

III. METHODOLOGY

The process involves selection of proper site and there by running some basic tests on the surface and gaining the knowledge about the surrounding and determining physiological characteristics of the road and the soil. Thereby determining ground water table level. To perform various tests on permeable concrete pavement and determine its sustainability as compared to conventional pavements. To recognize its impact on ground water table and maintain the quality and quantity of ground water. For site pavement we will conduct strength test flexibility test porosity test and determine the load bared by road at various intervals throughout the length of pavement for particular length (800m-1000m). Some of the tests for pavement and soil are as follows.

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3.1 Testsforsoil

Moisture content determination, specific gravity, field density, light and heavy compaction test, grain size distribution by sieve analysis and C.B.R. test.

3.2 Tests for pavement

Compressive strength test, abrasion resistance test, determination of block density, determination of water absorption and Skid test

	Proportions, kg/m³
Total Aggregate	267 to 326
Water: cement ratio	1190 to 1480
Fine aggregate	——
Cementitious	0 to 297

IV. INDENTATIONS AND EQUATIONS

4.1 Run-off calculations

4.1.1 Using Rational Method Equation

The Rational equation is the simplest method to determine peak discharge from drainage basin runoff. It is not as sophisticated as the SCS TR-55 method, but is the most common method used for sizing sewer systems.

- Rational Equation: Q=ciA
- The Rational equation requires the following units:
- Q = Peak discharge
- c = Rational method runoff coefficient
- i = Rainfall intensity (inch/hour)
- A = Drainage area (acre)

V. CONCLUSION

Use of permeable concrete pavement in place of conventionally used asphalt pavement can reduce the surface water runoff and can also enhance ground water quality and quantity. Moreover it can reduce the problems related to water-logging and ground water pollution.

It can be effectively used in underground parking systems, well linings, and etc. it also gives high filtration and flow rate as compared to conventional pavements.

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