

Spong City- Permeable Pavement Material – A Review

Shweta S.Jeurkar¹ Pratima S.Karale² Ruchika D.Mahale³ Shreedhar D.Patil⁴

^{1,2,3}UG Student ⁴Assistant Professor

^{1,2,3,4}Department of Civil Engineering

^{1,2,3,4}Dr. D. Y. Patil School of Engineering and Technology, Pune, Maharashtra - 412105, India

Abstract— Sponge city research aims to solve the problem of urban flooding by the sponge city concept. Through the urban development and Sustainable urban design, the advantages and success of sponge city are demonstrated. A sponge city concept is introduced to build a city structure which is design to absorb and utilization of rain water. Under various sponge city programs nearly 70% of excess rain water will be recycled and reused for various purposes. A sponge city is a city that acts as a sponge with an urban environment planned and constructed to soak up almost every raindrop and capture that water for reuse.

Keywords: There are six keywords in this project, which are infiltrate, detain, absorb, clean, use and discharge. This research will mainly focus on absorb and detain

I. INTRODUCTION

A “sponge city” refers to a city where its urban underground water system operates like a sponge to absorb, store, leak, and purify rainwater and release it for reuse when necessary. This will also mitigate a city’s water shortage. The construction of a sponge city is a complex task for engineering systems and requires a high volume of data about the city’s natural geography, social economy, water resources, and eco-environment. This is a complex method and one involving many challenges.

This study briefly introduces the opportunities of Sponge City, which was successfully implemented in China to overcome the above problems. Various techniques are used in sponge city concept-water permeable surface/ pavement is one of them. Water permeable pavement has three types. The following report represents comparison between impermeable and permeable pavement considering various aspects like comparison between construction cost, material, strength, life span, percentage of water reduced by permeable pavement.

II. PROBLEM STATEMENT

The construction of Sponge City is an effective approach to solving the urban water issues, particularly for the water logging. Proper channelizing and storage of excess water can be harnessed by the Sponge city projects. India is accelerating its mega dream of smart cities since the advent of 2010s. Incorporating the Sponge City idea under the realm of smart city project would save countless lives and millions of dollars. In the study of Sponge City new opportunities & challenges for the Sponge City construction in the future also proposed in this study.

III. OBJECTIVES

This hinders the natural cycle of infiltration of surface water into the ground, rise in temperature, increase in CO₂ levels as the plots are scarcely maintained with is the city area. - Collecting rain water from flood used for proper utilization

over entire urban areas.-Sponge city concept is used as a sustainable approach for various issues related to urban flooding.

IV. MATERIALS AND METHODS

A. Study Method

- To collect the data required for the project
- To collect the material required
- Study of research paper
- To study the type of permeable pavements required for the project
- To do market rates for study of material use for permeable pavement
- Analyze difference between permeable and non-permeable pavements
- Select suitable type of permeable pavement to do in practice

B. Difference

Permeable surfaces (also known as porous or pervious surfaces) allow water to percolate into the soil to filter out pollutants and recharge the water table. Impermeable/impervious surfaces are solid surfaces that don’t allow water to penetrate, forcing it to run off.

C. Impact

Pollution of surface water: When storm water runs off impermeable surfaces, it picks up pollutants as it flows into storm drains. The contaminated water then flows directly into rivers, lakes, wetlands and oceans, generating problems for biodiversity as well as public health.

Flooding of surface water and erosion of stream banks: During periods of heavy rainfall, large amounts of impermeable surfaces generate large amounts of runoff. This sudden influx of runoff into rivers can cause flash flooding and erosion of stream banks.

Water table is not adequately recharged: Because impermeable surfaces send rainwater into storm drains rather than allow it to percolate down to our aquifers, groundwater may be used faster than it is recharged.

V. LITERATURE REVIEW

Permeable Pavement by The Chesapeake Bay Trust (cbtrust.org)-When rainwater falls on conventional pavement, such as concrete, it accumulates and then flows across and off of impervious surface as stormwater runoff. Permeable pavement allows stormwater to slowly seep through, reaching the soil and groundwater below the surface. A variety of permeable pavement materials are available, such as interlocking pavers, porous asphalt, pervious concrete, and manufactured grass pavers. Interlocking pavers consist of precast blocks that are aligned in such a way that water is able to pass between the blocks into the soil below.

Compressive Strength of Pervious Concrete Pavements A Joint Research Program of Submitted by Manoj Chopra Marty Wanielista Ann Marie Mulligan Storm water Management Academy University of Central Florida Orlando, FL 32816 Editorial Review by: Ryan Browne -This project conducted experimental studies on the compressive strength on pervious concrete as it relates to water-cement ratio, aggregate-cement ratio, aggregate size, and compaction. Since voids are supposed to reduce the strength of concrete, the goal is to find a balance between water, aggregate, and cement in order to increase strength and permeability, two characteristics which tend to counteract one another. Analysis of traffic loadings reinforce the fact that pervious concrete cannot be subjected to large numbers of heavy vehicle loadings over time although pervious concrete would be able to sustain low volumes of heavy loads if designed properly. In all cases, high permeability rates were achieved regardless of the compressive strength.

VI. CONCLUSION

Permeable pavements can be a major contributor to the effective management of storm water.

They provide the opportunity of transforming a traditional source of storm water runoff into a best management practice for capturing, storing and infiltrating storm water into the natural surroundings.

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