International Journal of Engineering and Technical Research (IJETR)
ISSN: 2321-0869, Volume-2, Issue-3, March 2014

APPLICABILITY OF POROUS PAVEMENT

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***Abstract*— Infrastructure development in major cities of the country is getting covered with high buildings and road pavements. Traditional pavements cannot absorb the water through the pavement surface during the rainy season, which leads to problems like surface runoff and water logging on the site. One of the solutions of these problems is by installing porous pavement in place of the traditional pavement mainly for low volume roads.**

Now a day porous pavement is widely used in pavement works especially for road junctions, footpaths and parking areas. Porous pavement is used to reduce the imperviousness of firm surfaces for the purpose of reducing surface runoff and increasing the rate of infiltration. It can be effective in helping to reduce peak surface runoff rates or in improving the groundwater recharge characteristics of developed sites. The objective of this paper is to check the applicability of the porous pavement in low volume road of Hatkeshwar area. For this purpose rainfall data of Hatkeshwar area is collected and also the classified volume count is carried out to identify the low volume road.

***Index Terms*— low volume road, porous pavement, Traditional pavement.**

I. INTRODUCTION

A highway pavement is a structure consisting of superimposed layers of processed materials above the natural soil sub-grade. Traditionally pavements are designed to allow fluid to flow along the surface and drain towards catch basins and/or ditches along the side of the roads or parking lots. They cannot absorb water through the surface. Porous pavement is an alternative to traditional asphalt and concrete surfaces. This is distinct pavement type that actually permits fluids to flow through the structure. The purpose of this system is to encourage infiltration by reducing the amount of runoff that is produced from a site. Porous pavement is a system that allows rainwater and storm water runoff to move through the pavement's surface to a storage layer below and then to eventually seep into the underlying soil. Due to the high porosity of the pavement, this pavement is used only for low volume roads like's sidewalks, parking lots etc.

Manuscript received March 11, 2014.

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A. Application of Porous Pavement

- It is used in low volume road pavement.
- It can be used in sidewalks and pathways.
- It can also be used in parking lots.
- It can be used for storm water management.

B. Benefits of Porous Pavement

- It reduces the storm water runoff.
- It eliminates the need for detention ponds and other costly storm water management practices.
- Porous pavement replenishes the aquifers and water table.
- Porous pavement allows more efficient land development.
- It increases the infiltration rate of the surface.

Fig.1: Porous pavement

C. Difference between Traditional Pavement and Porous Pavement

An impervious surface is one that does not allow water to pass through it, so the surface produces storm water runoff during rain events. To reduce the effect of water logging, porous pavement is the best alternate solution which helps to prevent the water logging on pavement. The difference between the traditional and porous pavement shown in figure below. Traditional pavement cannot absorb the water

through the pavement surface, that's why the runoff produces on the site. On the other hand porous pavement can absorb the water through the surface to the underlying layer.

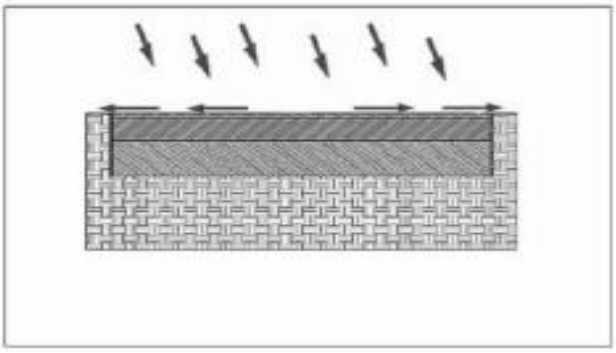


Fig.2(A) Rainfall on Traditional pavement

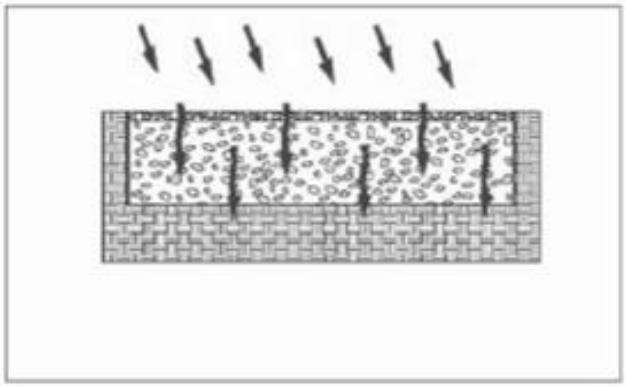


Fig.2(B) Rainfall on Porous Pavement

Fig.3 shows condition of traditional asphalt pavement and porous pavement after the occurrence of rain event. The traditional pavement is left wet and shiny; on the other hand the porous pavement becomes dry compare to traditional pavement.

Fig.3 Condition after the Rainfall

II. STUDY AREA

Hatkeshwar area of the Ahmedabad is one of the prime locations. The total population of Hatkeshwar area is about 92000 people (**source: Hatkeshwar zonal office**). It is the most waterlogged area in Ahmedabad city during the high rainfall. Main spots in this area where the most water logging occurs are Hatkeshwar circle, Radhikapark society, Rajeshpark society, Karnavati society and Tripada society. Out of which karnavati society is selected as the study area. If the rainfall occurrence rate is higher than 1 inch per hour, the area is generally going to be water logged.

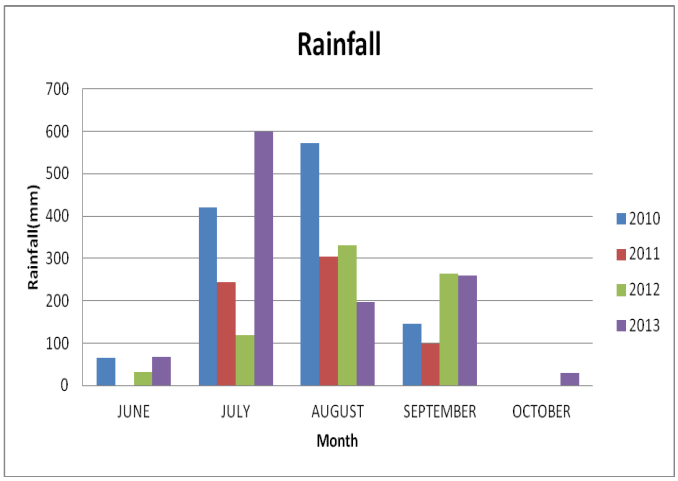
III. DATA COLLECTION

Table-1: Collection of Rainfall Data for Hatkeshwar Area of Ahmedabad City

MONTHLY SUMMARY				
MONTH	**2010**	**2011**	**2012**	**2013**
JUNE	65.00	0.00	32.00	67.00
JULY	419.50	245.00	120.00	598.00
AUGUST	572.30	303.50	332.00	198.00
SEPTEMBER	144.90	98.00	264.50	259.00
OCTOBER	0.00	0.00	0.00	30.00
TOTAL(mm)	1201.70	646.50	748.50	1152.00
INCH	47.31	25.86	29.47	45.35

Source: AMC office

Chart-1: Graphical Representation of Monthly Rainfall in Hatkeshwar Area



IV. TRAFFIC SURVEY

The traffic volume count survey was carried out for the purpose of identifying the area having low traffic

volume. The traffic survey was conducted in the internal street road of the Hatkeshwar area in front of karnavati society. Traffic volume details in PCU/hr are tabulated as below:

Table-2: Traffic Volume Details

AREA	DIRECTION	VOLUME (PCU/Hr)
HATKESHWAR AREA (KARNAVATI BANGLOWS)	Hatkeshwar to CTM	135
	CTM to Hatkeshwar	143
	Karnavati to Hatkeshwar	65
	Hatkeshwar to Karnavati	82
	CTM to karnavati	15
	Karnavati to CTM	14

Chart-2: Graphical Representation of Traffic Composition

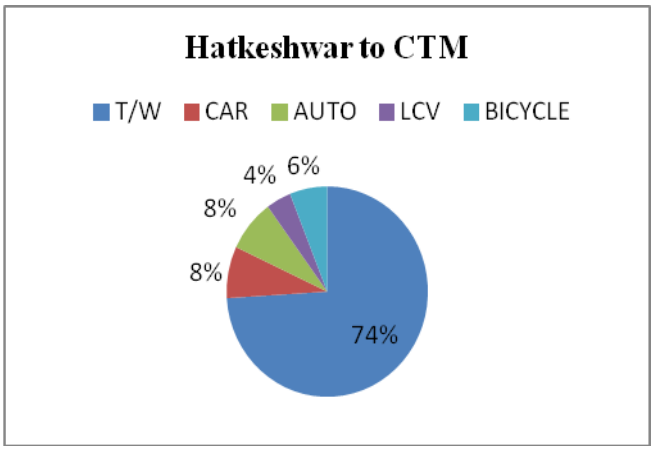


Chart-2.1 Hatkeshwar to CTM

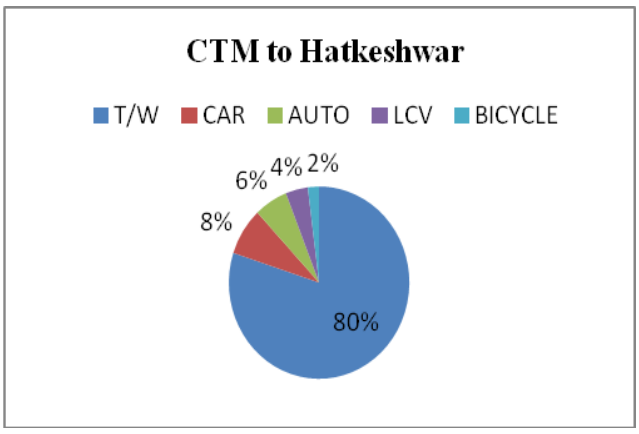


Chart-2.2 CTM to Hatkeshwar

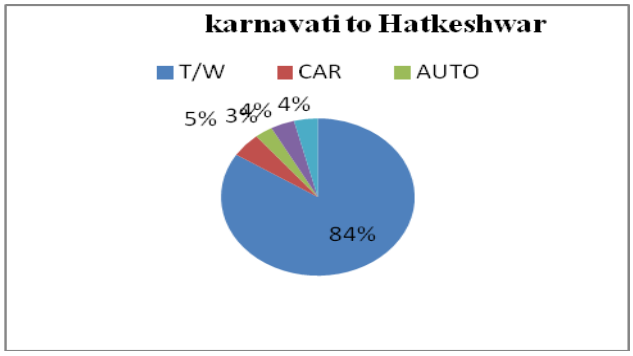
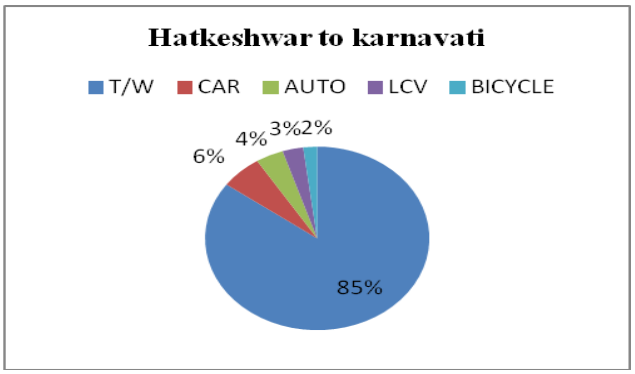


Chart-2.3 Karnavati to Hatkeshwar



Chare-2.4 Hatkeshwar to Karnavati

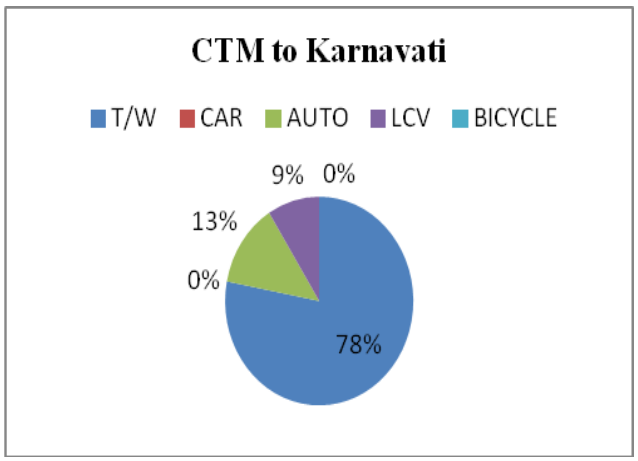


Chart-2.5 CTM to Karnavati

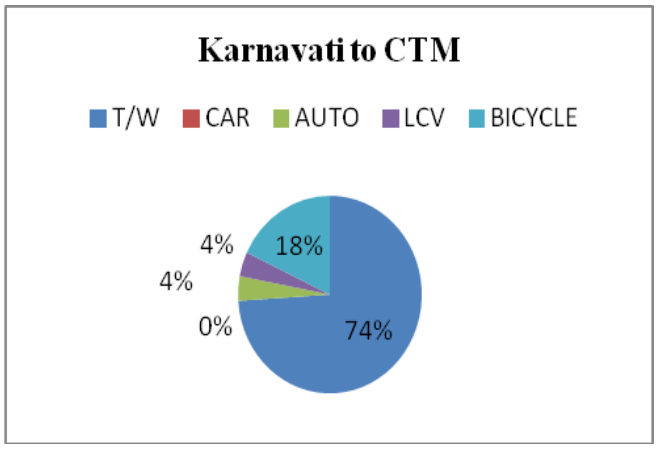


Chart-2.6 Karnavati to CTM

V. ANALYSIS OF DATA

According to the data rainfall for the month of June, July, august, September and October are 1.61, 13.61, 13.84, 7.54, 1.18 inches respectively. Which indicates Hatkeshwar area is highly waterlogged zone. The graphical representation of traffic composition shows above which indicates that the road used by the local public for light motor vehicle. In all survey it is found that majority of users are using two-wheeler on an average of 79 %. All these analysis is done for a selected street road which is located at the Hatkeshwar area, so for light motor vehicle and an average rainfall the selected area is suitable for the applicability of porous pavement. For this type of waterlogged condition, using the porous pavement it is possible to reduce water logging on the site**.** According to the volume count data the road of study area is considered as a low volume road which is suitable for the porous pavement study. The depth of water logging in the study area is about 40-50cm during high rainfall.

VI. CONCLUSION

The rainfall data are collected for this study and also volume count survey is to be carried out. From the data it is concluded that the concept of the porous pavement is applicable for the low volume water logged area. Porous concrete, porous asphalt and interlocking concrete paver block are the best solutions in that type of area.

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