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CONSTRUCTION OF INTERLOCKING BRICKS USING NON CONVENTIONAL MATERIALS

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ABSTRACT

The pervious pavement is made up of porous concrete that allows water to seep though the gaps and voids in between them while providing stable & load bearing capacity to the pavement. Water logging , Heavy rain falls and drainage problems are always have been major issues in ROAD DEVELOPMENTS , which usually causes tremendous floods, landslides ,soil erosions & many more hazards too. Here we are presenting an optimum solution i.e., Interlocking Bricks with Pervious Pavement system.

Here we used pervious pavement for drainage purpose and a layer of interlocking bricks for providing strength & and arrange them all in such a pattern that we get a proper gap between pattern of bricks from where storm water/rain water/ surface run off etc. can easily seep through pervious pavement.

For construction of pervious pavement we replaced fine aggregates by fly ash to gain proper void as well as pervious property and for construction of interlocking bricks we used industrial waste, which contains excess amount of Ferrous in it.

We have done the entire related test like, water absorption test, hardness test, fractured load test, etc to gain proper results.

They are mainly applicable for parking areas, sideways, path ways , residential roads , alleys etc.

Keywords- Pervious pavement, fly ash, pervious properties and various tests.

I.INTRODUCTION

Water logging is a major problem in the context of India, whose exact solutions are available but not enough, due to which obstruction in road development has started in India.

With the help of these interlocking bricks and pervious pavement, we can get rid of it quite a bit.

In this scenario Strom Water / Surface run off etc. will be sent to the pervious pavement through voids in it & from there it will taken to underground drainage means And for this we will not need to recreate the expensive and useless drains that are easily get chocked.

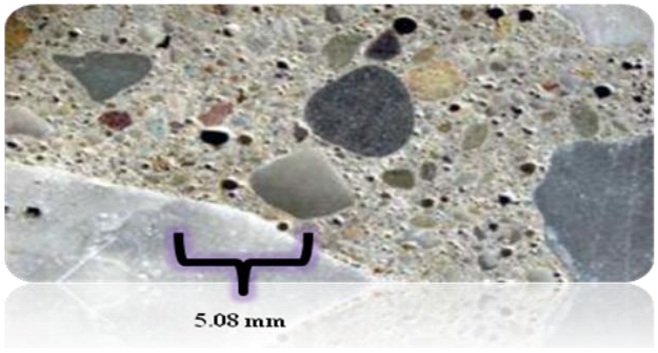
But in order to use it on the roads, we need strength in it, which is not easily gained due to the sand being replaced by the fly ash in the Pervious Pavement. We used the Industrial waste to create the interlocking bricks, which gives very good strength in comparison to the Convention Interlocking bricks, and these bricks can be made at low cost in comparison to the Convention Interlocking bricks.

In our working model the water will go into the pervious pavement from the gap between the surface of the interlocking bricks or the pattern of the bricks, and from there seep through the underground drains.

II.CONVENTIONAL VS PERVIOUS

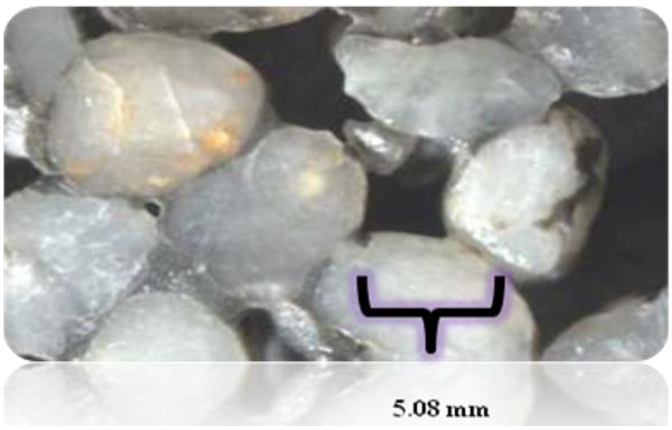
In conventional concrete there is no replacement of fine aggregates i.e., sand but pervious concrete sand is replaced by fly ash in predefined proportions.

if sand in concrete is fully replaced by fly ash then particularly it will provide many merits like no fines concrete is environment friendly to support sustainable construction but strength will be reduced up to some percentage depending upon grade of concrete used .



CONVENTIONAL

Fig. 1 Size Voids in conventional concrete



PERVIOUS

Fig. 2 Size Voids in pervious concrete

III.MAKING OF INTERLOCKING BRICKS

Industrials waste had been taken from the gallant industries, gida, Gorakhpur which contain maximum amount of ferrous in it & provide strength to bricks but there is also probability of corrosion or decay which may get

reduced when some special type of chemicals or sand or small sized aggregates is applied or placed between interlocking bricks or also polymer cover can be used for highly rain affected areas.

For Interlocking Bricks

- Cement , Sand , Aggregates , Industrial waste , Water

For Pervious Slab

- No Fine Aggregates & It is Replaced by Fly Ash
- Water
- Coarse Aggregates

Laboratory Tests

Following laboratory tests have been carried out as per standards. The tests were carried out both on industrial waste and different proportion of fly ash added in pervious pavement construction & waste is collected from Gallant.

1.1 Moisture content Test
1.2 Fractured load Test
1.3 Water absorption Test
1.4 Strength Comparison
1.5 Replacement Analysis

1.1 *Moisture Content Test:-*

1.11 *Industrial Waste* –

Weight of container = 41.967gm
Weight of industrial waste + container = 141.967 gm
Weight of industrial waste + container= 136.110 gm
Weight of industrial waste = 100 gm
Temperature 110`C

1.12 *Fly Ash* –

Weight of container = 41.40 gm
Weight of fly ash + container = 141.40 gm
Weight of fly ash + container = 135.776 gm
Weight of fly ash = 100 gm
Temperature 110`C

1.2 *Water Content :-*

1.13 *Industrial waste*

= {(M2-M3)/(M3-M1)}*100 =

{(141.967-136.110)/(136.110-41.967)}*100 = 6.22 %

1.14 *Fly ash*

= (M2-M3)/(M3-M1) =

{ (141.40-135.776)/(135.776-41.40) }*100 = 5.95 %

Where M1 = Mass of container

M2 = Mass of container + wet sample

M3 = Mass of container + dry sample

1.3 *Fractured Load Test:-*

Conventional Interlocking Bricks = 475 KN

Non Conventional Interlocking Bricks = 700 KN

1.4 *Water Absorption Test:-*

Weight of brick before immersed in water = 5.65 kg

Weight of brick after immersed in water = 5.99 kg

Water absorption (%) = {(5.99-5.65)/(5.65)}*100 = 6.017 %

1.5 *Strength Comparison:-*

Non Conventional Interlocking Bricks (curing done for 7 day) (Kn/M^2)	**Conventional Interlocking Bricks (curing done for 28 day) (Kn/M^2)**
11727.68	12013.2
9439.35	13157.89
9153.31	12299.77
12013.2	11727.68

Table 1 Strength comparison between conventional/non conventional interlocking bricks

1.6 *Replacement Analysis:-*

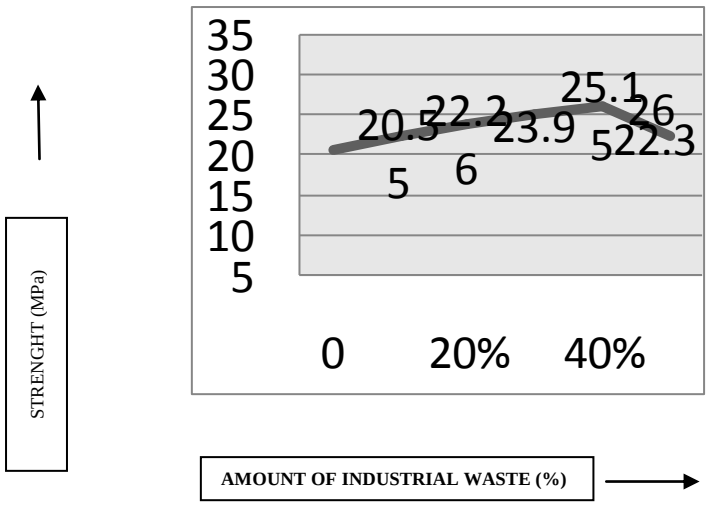


Fig. 3 Replacement analysis

Example – For 1 Kg, If 10% of industrial waste is used, It means ,

100g = Industrial waste

900g=Sand

Ratio = 1:1.5:3 (Interlocking bricks of industrial waste)

IV.TYPICAL PLACING PROCEDURE

To make a proper pavement of interlocking bricks and pervious concrete, first we construct pervious concrete on site or may take pre constructed panel to the site and then lay a layer of interlocking bricks on them is such a pattern that there should be a proper gap between interlocking bricks, which help run off to seep through from them, and in between those gaps we fill small sized aggregate as shown in figure 4 below:-

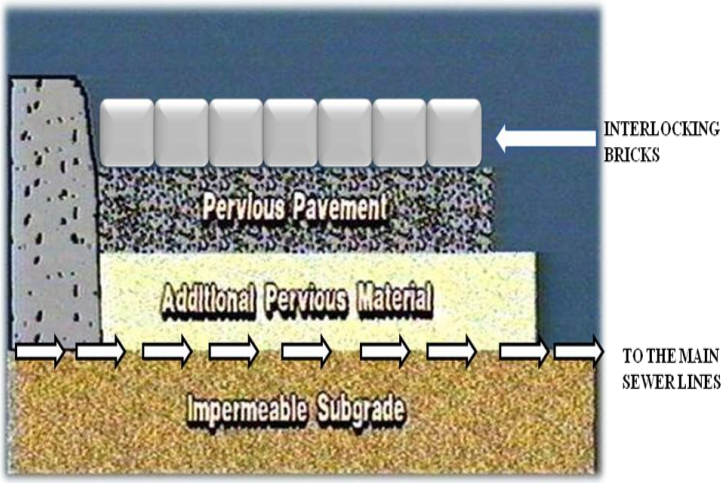


Fig. 4 Pavement sections

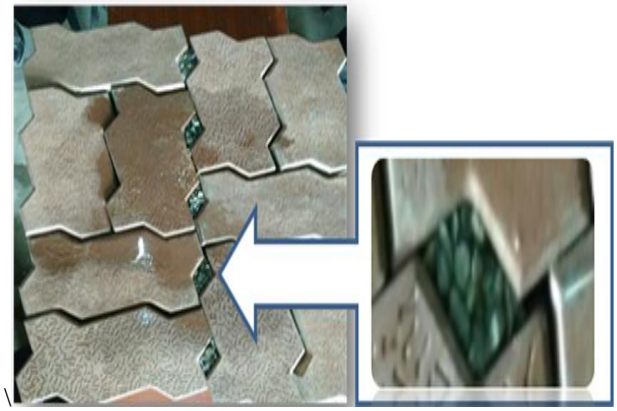


Fig. 5 Top view of whole pavement and gap between bricks

Fig. 6 Pervious Pavement with interlocking bricks

After construction and placing, the pavement may open within 7 days and it also may be dependant of weather conditions.

V.MAINTENANCE

1. Carefully handled as constructed, on the site.
2. If get clogged then should be get cleaned by pressure wash or by vacuuming the surface.

VI.CONCLUSIONS

There are few conclusions we get after construction and various test on interlocking bricks & pervious pavement which are given below:-

- It Improves drainage systems
- Provide help Ground water recharge
- Reduce water logging problems
- It is Durable
- Provide Aesthetic Appearance
- Have Zero run off properties.

- It mitigates first flush
- It reduces surface Temperature
- It also Eliminate cost of drainage systems
- Reduce Storm water utility fees
- It effectively Eliminates need for:-

- Retention ponds
- Detention ponds,

other costly storm water management practices.

- Provides more efficient use of land.
- Tensile & flexural strength is lower than of conventional. (Pervious slab)
- Have High coefficient of permeability .
- It Reduces first flush pollutants like :-

- Oil.
- Other automotive fluids.
- Various Chemicals.

- It Treats water & pollutants naturally.
- Contaminated water easily percolates into the ground via these pavements

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