INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

**ISSN: 2454-132X**
**Impact factor: 4.295**
***(Volume 4, Issue 2)***
Available online at: www.ijariit.com

# Precast Polymer Paver (road)

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## ABSTRACT

***Polymer and rubber tier which is increasing day by day becomes eyesore and it pollutes the environment. A large amount of polymer and tier are discarded or burned which effect to environment and air. Hence, these waste polymer (HDPE) and rubber (tier) are to be effectively utilized. In this project High-density polyethylene (HDPE) bags, bottle and rubber crumb are cleaned and melted and then aggregate is added, this homogenous mixture is poured in cube and placed in oven for crystallization process. After crystallization of 2 to 3 hours cube is ready for use, it does not required curing. Like a small cube of 15cm x 15cm x 15cm large size of paver can also be formed such as 1m x 1m or as per design requirement in industry and placed on land for the use of road and footpath. This alternatively saves the quanta of cement and reinforcement which is costlier product in road construction project. With the help of more research on this pre cast polymer road its properties can be enhance easily.***

**Keywords:** *High density polyethylene (HDPE), Rubber crumb, Crystallization.*

## 1. INTRODUCTION

Precast polymer pavement or road is rigid pavement which is formed by mixing and melting of HDPE, crumb rubber and aggregate. Material required for precast polymer road is 50% High density polyethylene, 10% Rubber tier crumb and 40% Aggregate.

Characteristic of HDPE: Thermoplastic polymer, Recyclable, Melting point 137 °c, Good compressive strength, compressive yield strength is 26.2 to 33.1 Mpa, Chemical resistance

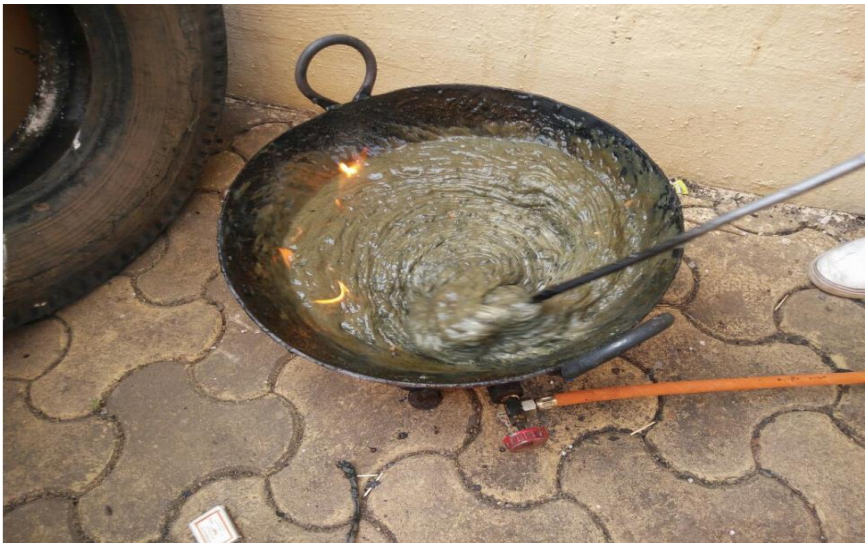
## 2. OBJECTIVE

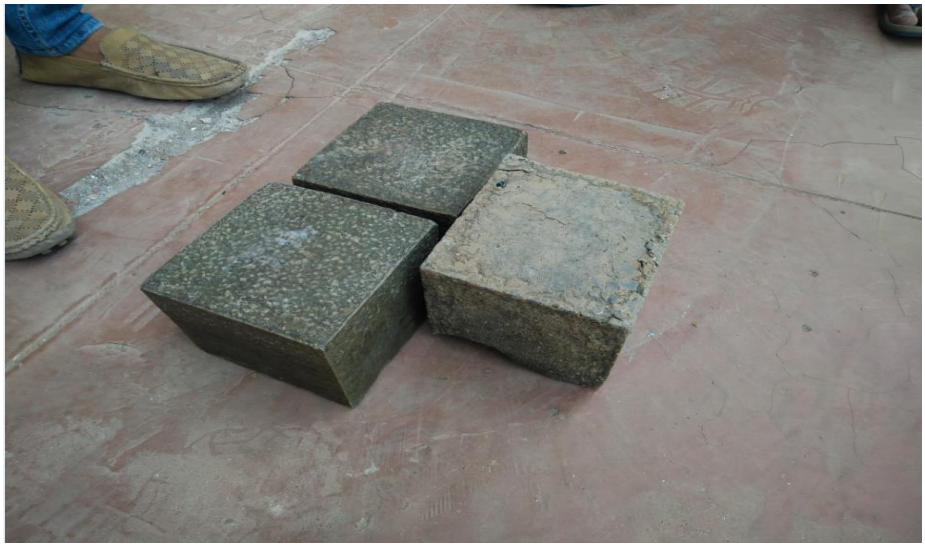
- Use of waste tire and HDPE
- To decrease the use of natural product
- To decrease the construction time of road
- Economical construction

## 3. METHODOLOGY

- Mixing and melting of HDPE (4 -8mm) and tier crumb (4-8mm), after that fine aggregate is added and thoroughly mixed.
- Melting of these raw products over a kadhai (utensil) with the help of gas cylinder.
- Heating mixture up to 137 $^{o}$c to 145$^{o}$c until a viscous homogenous mixture is formed.
- This homogenous mixture is poured in to cube mold.
- After pouring of mixture in to mold, with in a 5 –10 min moldshould place in to oven for the process of crystallization.
- The crystallization process required 1-2 hours.
- After the process of crystallization a dense polymer product is formed which is ready for use.





## 4. SIGNIFICANCE

- Reuse of waste hdpe and tier crumb.
- Ecofriendly project.
- Quality can be maintained easily.

- Required less timeto manufactured.
- It is less costlier then concrete and bitumen road.
- It required less labor.
- It required less equipment.
- This product also not required curing.
- After laying of this polymer block it can be directly open for traffic.
- Maintenance of this road is easy.

## 5. TEST

a. compression test:- sample 1 =21mpa , sample 2= 20.5mpa, sample 3=19mpa

Average =20.17≈20

b. Tensile test:- sample 1=8mpa, sample 2=6.8mpa, Sample 3=6.3mpa

Average =7.03≈7mpa

c. Rebound hammer test at α= -90° :- face 1=320 kg/cm$^2$, face 2=210 kg/cm$^2$

Face 3=290 kg/cm$^2$ , face 4=198kg/cm$^2$

Face 4=280 kg/cm$^2$ , face 6=238 kg/cm$^2$

Average =256 kg/cm$^2$

d. Average water absorption= 0.65%

## 6. CONCLUSION

From test it can be concluded that ratio 1:4:5 (crumb rubber: fine aggregate: HDPE) use to design precast paver can be used for light traffic road such as other district road, village road and footpath.

## 7. REFERENCE

[1] Material science and engineering (William D. callister ) pg- 545 to 628.
[2] Article of “composite railway sleeper in indiansub continent” pg- 133 to 137.
[3] Article of “waste plastic in manufacture of bricks and paver bocks” pg- 364 to 368
[4] Article of “use of plastic in bituminous road”pg – 123 to 128.