EXPERIMENTAL STUDY ON PERFOMNCE OF MARBLE WASTE AND GLASS FIBRE IN CONCRETE FOR RIGID PAVEMENT

Makwana Rohit B
M.Tech Student
Civil Engineering Department
Atmiya University, Rajkot,
Gujarat, India.

Hardik Pujara
Assistant Professor
Civil Engineering Department
Atmiya University, Rajkot,
Gujarat, India.

Asharaf Mathakiya
Assistant Professor
Civil Engineering Department
Atmiya University, Rajkot,
Gujarat, India.

Abstract- It has construct road in india so far. As flexible and rigid pavement. Now day village road and city corridor. road to use rigid pavement. in India most of state connect in their Capital city. Govt is launch PMGSY to connect the villages. most of the village is connect the District level. more transportation increase so road pavement strength is more importance. so as transportation engineering pavement is main function. So most of two type of pavement like Flexible pavement and Rigid Pavement. so it can be their compressive strength and Flexural strength is consider. As per irc 44 2017. As per design M40 concrete design considered. To use waste material to made concrete pavement. To use as waste marble waste in concrete. It is partial replacement of coarse aggregate. In partially replacement of CA in 10% , 20% , & 30% . and to compare the normal pavement concrete to partially replacement of concrete pavement. And use as admixture Glass Fibre in concrete pavement. And it test the specimen. Like beam and cubes. It has increase their flexural strength and compressive strength respectively.

Keywords – Marble Waste As Coarse Aggregate, Cement, Sand, Concrete Pavement aggregate, fiber.

I. Introduction

Transportation has been one of the essential components of the civil engineering profession since its early days. From time immemorial, the building of roads, bridges, pipelines, tunnels, canals, railroads, ports, and harbors has shaped the profession and defined much of its public image. As cities grew, civil engineers became involved in developing, building, and operating transit facilities, including street railways and elevated and underground systems The role of civil engineers is to providing transportation infrastructure to accommodate a growing population. The transportation by road is the only road which could give maximum service to one all.

1.Rigid Pavement

In rigid pavement is long life gain compare to flexible pavement and it has to load carriage capacity is very high.it has many purpose to use the rigid pavement.Its strength comes from its flexural strength, and is capable of supporting the load on the driving wheels and overcoming the weaknesses of the layers below. However, providing sub-base/base course below the cement concrete pavement will improve its performance significantly; therefore, a well-designed and well-constructed cement concrete pavement will be a rigid pavement capable of providing hassle-free and high-quality riding surface for high-volumes and heavy traffic loads for as long as 30 to 50 years. Portland cement concrete is well understood in its engineering behavior and hence, a concrete pavement can be rationally designed. Pavement Quality Concrete (PQC) is cementing concrete made with coarse

aggregates according to IRC specifications and placed on a dry concrete base. This construction is specially used for highway and airport runway pavements as it can withstand heavy loads.

2.Marble waste as coarse aggregate

Marble waste is produced from marble industries as a result of production. More production equals more waste, more waste creates environmental contamination. A high volume of marble production has generated a considerable amount of waste materials; almost 70% of the minerals gets wasted in the mining, processing and polishing stages which have a serious impact on the environment. Also, a large amount of marble is accumulating in the environment due to demolition of old structures having marble. This causes environmental pollution. An economically viable solution to this problem should include utilization of these waste materials for new products especially in construction applications which in turn minimizes the heavy burden on the nation's landfills, saves natural resources, energy and reduces environmental pollution

Fig-1

Fig-2

II. LITERATURE REVIEW

2.1 Impact of marble waste as coarse aggregate on properties of lean cement concrete.

The main objective of this study was utilization of marble waste as a replacement for conventional natural coarse aggregate in concrete. Experimental investigations were carried out to examine the feasibility of use of marble waste as a coarse aggregate in concrete. Conventional natural coarse aggregate was replaced by marble aggregate in different percentages 0–100% by weight. The concrete formulations were prepared with a constant water–cement ratio 0.60.

2.2 Effect of fly ash and marble Powder on strength of pavement Quality concrete.

Concrete pavement construction is growing throughout the country due to its strength, durability, excellent performance, and overall long-term savings. At two different substitution levels, cement was partially replaced by fly ash (10%, 20%,), marble powder, When. The test was performed 28 days after the concrete set.

2.3 Replacement of Recycled Construction and Demolition Waste Coarse Aggregates in Pavement Quality Concrete.

A CA replacement scheme in concrete is investigated with five different replacement ratio sincluding 20%, 40%, 60% and 80%, & 100%. After beneficiation, recycled materials were replaced for CA in m30 and m40 grade of concrete.The compressive strength is found to be for m30 – 40.45n/mm^2 & m40 – 51.33n/mm^2,the flexural strength is found to be for m30 – 11.55n/mm^2 & m40 – 15.60n/mm^2 .

2.4 Glass fibre reinforced concrete for rigid pavement.

This paper presents experimental investigations mainly on mechanical properties of M30 grade of concrete considering water cement ratio 0.47.Glass fibre was added in green concrete by volume of concrete percentages from 0% to 0.4% with increment of 0.1The flexural strength and split tensile strength increased up to 35% and 32% respectively. M30 grade concrete reached compressive strength equivalent to the M40 grade concrete.

III. Material and Methodology

To be material select and conduct various test. To tested physical properties of cement, aggregate etc.

3.2 Basic Material

Cement.
Coarse Aggregates (20 mm , 10mm , 6mm.) and Marble waste as CA.
Sand (fine aggregate).
Glass Fibre.

3.3 Physical Properties Of Cement

Initial setting time		78 min.
Final setting time		240 min.
Compressive strength	7 days	32.3 N/mm2
	14 days	40.9 N/mm2
	28 days	58 N/mm2
Fineness (90 um sieve)		1.7 %
Standard consistency		25.85 %

3.4 Physical Properties Of Coarse Aggregate

Aggregate Impact value	12.4
Aggregate Abrasion Value	16.3
Specific Gravity	2.85
Water Absorption	0.94
Combined Flakiness Index, Elongation Index	19.36

3.5 Mix design As per IRC 44 2017

Cement = 442 kg/m^3
Water = 186 kg/m^3
Fine Aggregate = 633 kg/m^3
Coarse Aggregate =1157 kg/m^3
Water-cement ratio = 0.42
Marble waste (10%) 115 kg/m^3
(20%) 231 kg/m^3
(30%) 347 kg/m^3
Glass fibre (0.5 %) = 2.21 kg

IV. TESTING AND RESULT


Fig-3


Fig-4


Fig-5


Fig-6

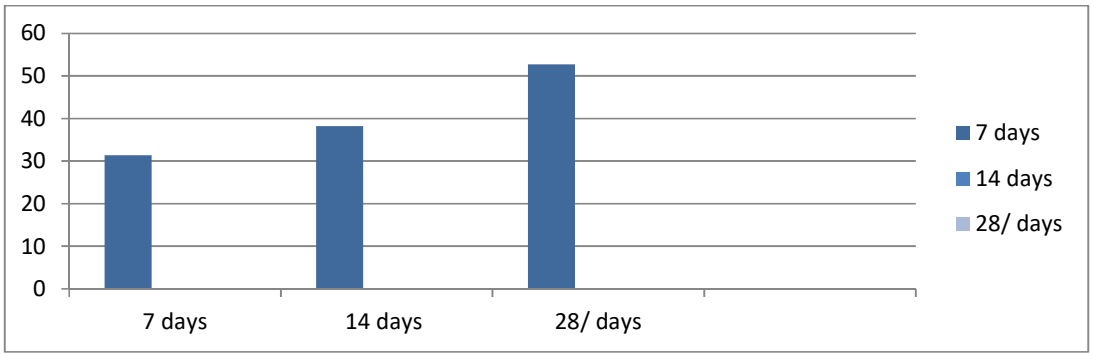

Fig-7


Fig-8

1. Result

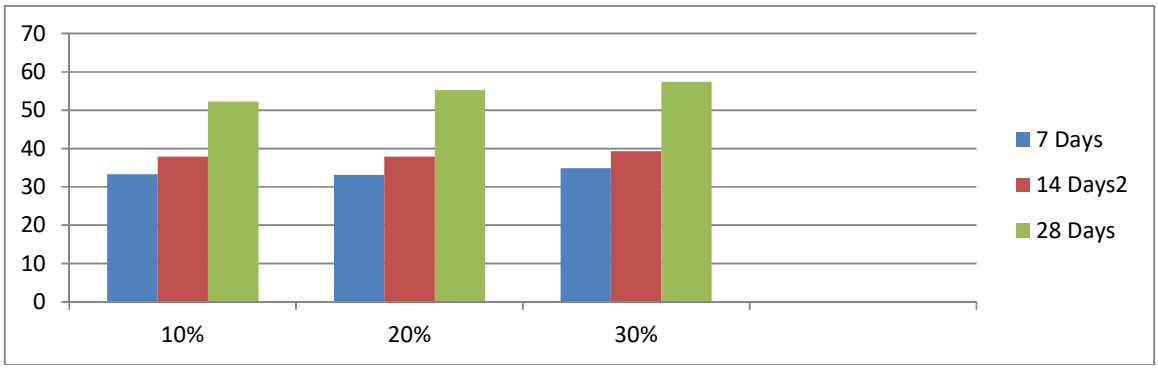
Results of Compressive strength		
Days	Partially replacement	
7	0	31.35
14	0	38.21
28	0	52.70

Table - 1



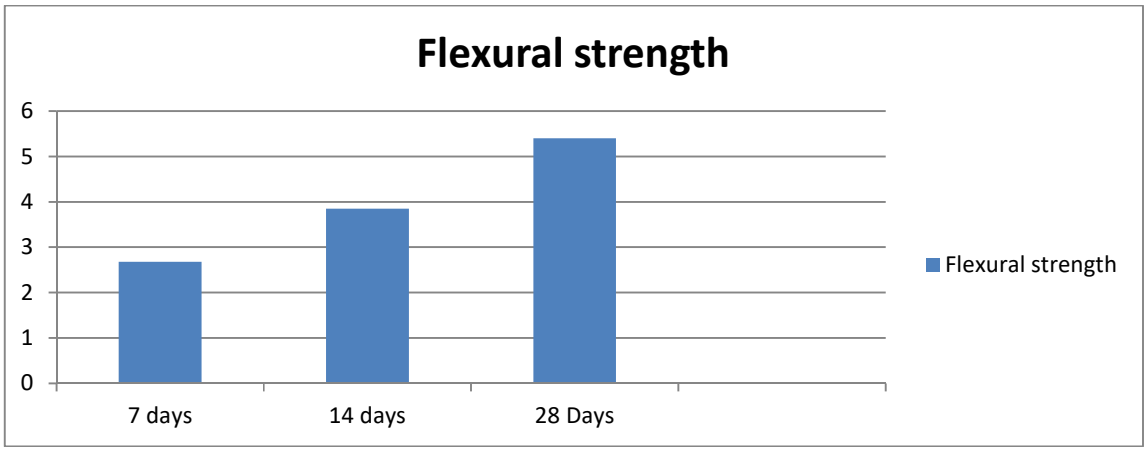
Sr no	Replacement in %	Compressive strength in N/mm2		
		7 Days	14 Days	28 Days
A	10	33.31	37.90	52.31
B	20	33.10	37.96	55.31
C	30	34.86	39.31	57.46

Table – 2



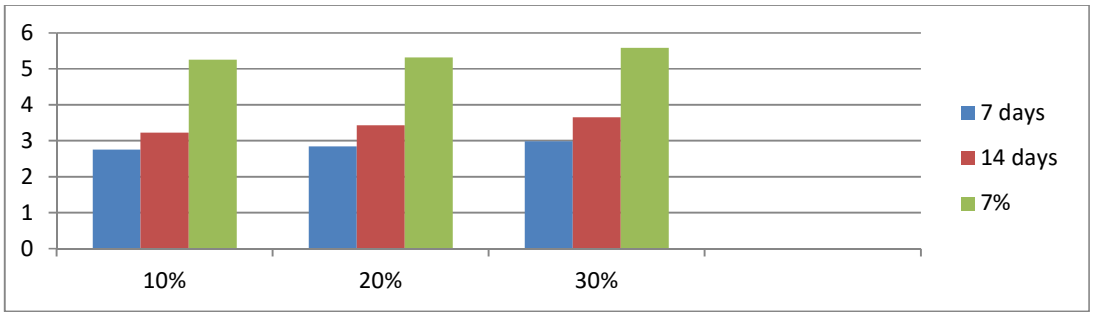
Results of Flexural strength		
Days	Partially replacement	
7	0	2.68
14	0	3.85
28	0	5.04

Table -3



Results of Flexural strength			
Partially replacement(%)	Days		
	7	14	28
10	2.75	3.23	5.25
20	2.84	3.43	5.32
30	2.98	3.65	5.51

Table -4



VI. conclusion

This study was conducted to investigate the effect of partial replacement of Marble waste as coarse aggregate. With as admixture Glass fibre. The compressive and flexural strength of concrete mixes. At Three different substitution levels, aggregate was replaced Marble Waste as coarse aggregate (10%, 20%, 30%), marble waste , When. The test was performed 7 days,14 days, 28 days. after the concrete set. Cubes and beams were cast for determining compressive strength and flexural strength of concrete with grades of concrete M40 as per irc 44 2017. It has gradation and design respectively.use Glass fibre as admixture by weight of cementations material 0.5 %. and it has compare the conventional Concrete pavement to partial replacement of coarse aggregate. Like 10%,20%,30%. And it has more strength is provided to set of concrete as to 20% and 30% respectively.

Reference

1 .Use of waste marble aggregates in concrete.
hebhoub a, h. aoun b,, m. belachia a, h. houari c, e. ghorbel .

2. Impact of marble waste as coarse aggregate on properties of lean cement concrete.
Sudarshan D. Kore, A.K. Vyas.

3. Comparison of conventional concrete with partial replacement of coarse Aggregate with marble waste in concrete .
K.Raghavi, S.Bhagyalakshmi, M.Vidhya Lakshmi International Journal of Advanced Research Trends in Engineering and Technology (IJARTET) 2017.

4. Waste Marble Chips As Concrete Aggregate Jay P. Chotaliya, Kuldip B Makwana, Pratik D Tank IJEDR 2016 .

5. Durability Properties of Concrete Produced by Marble Waste as Aggregate or Mineral Additives.
Turhan Bilira, Recep Artirb .

6. .Cost Effective Design of Sustainable Concrete Using Marble Waste as Coarse Aggregate .
Sudarshan D. Kore , A. K. Vyas .

7. Glass fibre reinforced concrete for rigid pavement.
Sanjeev kumar suman and pratik kumar .

8 .A Review on Effect of Fiber Reinforced Concrete on Rigid Pavement .
Ms.Amreen N. Al , Mr. Milind. V. Mohod .

9. Irc 44 2017 Guidelines For Cement Concrete Mix Design For Pavements.

10.Irc 15 2011 Standard Specifications And Code Of Practice For Construction Of Concrete Roads.