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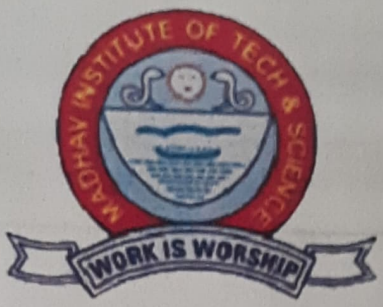
Gwalior, Madhya Pradesh - 474005



TRANSPORTATION ENGINEERING

110413

A MINI-PROJECT REPORT

ON

"CRUSHING STRENGTH OF MIX AGGREGATES"

Submitted by

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Department of Civil Engineering

Madhav Institute of Technology & Science

2022

CERTIFICATE

Madhav Institute of Technology & Science
Gwalior

This is to certify that the project entitled "CRUSHING STRENGTH OF MIX AGGREGATES" presented by the students of group- in incomplete satisfaction of the necessity of the recompense of Bachelor of Technology degree in Civil Engineering at Madhav Institute of Technology & Science, Gwalior is a genuine work completed by the students under my watch and direction.

To the best of my insight, the matter epitomized in the theory has not been submitted to any other college/Institute for the recompense of any Degree or Diploma.

Under the Guidance of-

Guide Name : Prof.Jayvant Choudhary
Department of Civil Engineering

Date:

Dr. M.K. Trivedi
Head of Department

ACKNOWLEDGEMENT

It offers us a great pleasure to thank and offer appreciation to each and every one of those people who have specifically or by implication helped us through the course of this study. This undertaking would have never been finished without the commitment of those individuals.

Unfortunately, the long list of acknowledgement, regardless of how extensive is constantly fragmented and lacking. To be sure this page of notice should never have the capacity to touch the generousness of the individuals who tendered their assistance to us.

As a matter of first importance I wish to express my profound feeling of appreciation and obligation to **Prof. Jayvant Choudhary**, Department of Civil Engineering – MITS, Gwalior for appointing me the undertaking " CRUSHING STRENGTH OF MIX AGGREGATES" and for his motivating direction, helpful feedback and significant proposal all through this venture. We also want to extend our appreciation to every one of our companions and senior understudies who have constantly empowered and bolstered us in doing this work. We want to thank all the individuals from Department of Civil Engineering who have dependably been agreeable with us.

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PROBLEM STATEMENT

Optimising the proportion of recycled brick aggregates in conventional aggregates based on the crushing strength criteria.

INTRODUCTION

Waste management is one of the priorities of everycommunity and it has become evident that good wastemanagement can enhance the quality of life. Principle of a quality waste management is in lowering themass production of new, finding ways to recycle and reuse existing, and safe and ecologically acceptable depositing ofunused waste.Fine recycled brick aggregates recovered from demolished structures can be utilized in the manufacture ofnew concrete mixtures.The utilization of crushed brick as anaggregate in mortar and concrete would have a positiveeffect on the economy also.By using the recycled clay brick as an aggregate in concrete it is possible to design concrete mixtures in the same way as the design mixtures for commonly usedaggregates.

OBJECTIVE:

The aims of mixing crushed brick aggregates to the conventional aggregates is to strengthen the workability, and buildability with lowering the construction cost.
To find the effectiveness of crushed bricks in improving the aggregate properties and to find whether it is worth it to be used or not. And also to find the good percentages and aspect ratios to be used later and find the optimum dimension and percentages.

THEORY:

The aggregate crushing value provides a relative measure of resistance to crushing under a gradually applied compressive load aggregate used in road construction should be strong enough to resist crushing under traffic wheel load.

If aggregates are weak, the stability of pavement structure is adversely affected. The strong aggregate will have low crushing value and weak aggregates have high crushing value. The aggregate crushing value less than 30 can be used in surface pavement layer.

The important mechanical properties of aggregates for use in construction of road pavements are to resist crushing under the roller during construction and under the application of heavy wheel loads on the pavement during its service life. Crushing strength of road may be determined by finding the resistance to crushing of the coarse aggregates under applied load.

REPORT:

The optimum ratio value of brick aggregate with respect to conventional aggregates through crushing strength test was helped by the following apparatus;

1. Steel cylinder with open ends and internal diameter 150 mm with an appropriate plunger and a piston.
2. Cylindrical measure having internal diameter of 115 mm and height 180 mm.
3. Steel tamping rod with one rounded end, having a diameter of 16 mm and length 450 to 600 mm.
4. Balance.
5. IS sieves of sizes 12.5, 10.0 and 2.36 mm.

So as to get the optimum ratio, used and recycled bricks were collected from the construction site from the college campus itself. These small parts of bricks were broken down into smaller sizes so as to pass from 12.5mm sieve and to get retained in 10mm sieve.

Sample of dry coarse aggregate were also taken passing through standard test sieve of size 12.5mm and retained at 10.0mm sieve.

The samples were taken according to 3 to 4 trials of tests and henceforth finding the optimum value.

The tests were done in 4 trials, mixing bricks aggregate with the coarse aggregate by weight. Brick was added for 35%, 30%,25%,20% of total weight of the mix.

The 3500gm of test sample is obtained by filling the cylindrical measure, the test sample is filled in three layers while tamping by tamping rod 25times on each layer. After the third layer is tamped, the aggregates at the top of the cylindrical measure is levelled off by using the tamping rod. The same weight of the sample is taken in the repetitive trial tests.The cylinder with the test sample and plunger in position is placed on compression testing machine. Load is then applied through the plunger at a uniform rate of 4.0tonnes per minute until the total load is 40 tonnes and then the load is released. Aggregates including the crushedportion are removed from the cylinder and sieved on a 2.36 mm test sieve. The material which passes this sieve is collected and weighed.

The aggregate crushing value is defined as a ratio of the weight of the portion of crushed aggregate fines underthe specified load of 40 tonnes that passes the specified test sieve (of size 2.36 mm) to the total weight of theSample, expressed as a percentage.

Trial 1:

35% of recycled brick is mixed with coarse aggregate by weight(910gm)

Weight of aggregate(w_1)	Weight of agg. Passing through 2.36mm sieve(w_2)	Crushing value
2600	810	31.15%

Trial 2:

30% of recycled brick is mixed with coarse aggregate by weight(770gm)

Weight of aggregate(w_1)	Weight of agg. Passing through 2.36mm sieve(w_2)	Crushing value
2610	705	27.01%

Trial 3:

25% of recycled brick is mixed with coarse aggregate by weight(655gm)

Weight of aggregate(w_1)	Weight of agg. Passing through 2.36mm sieve(w_2)	Crushing value
2625	655	24.95%

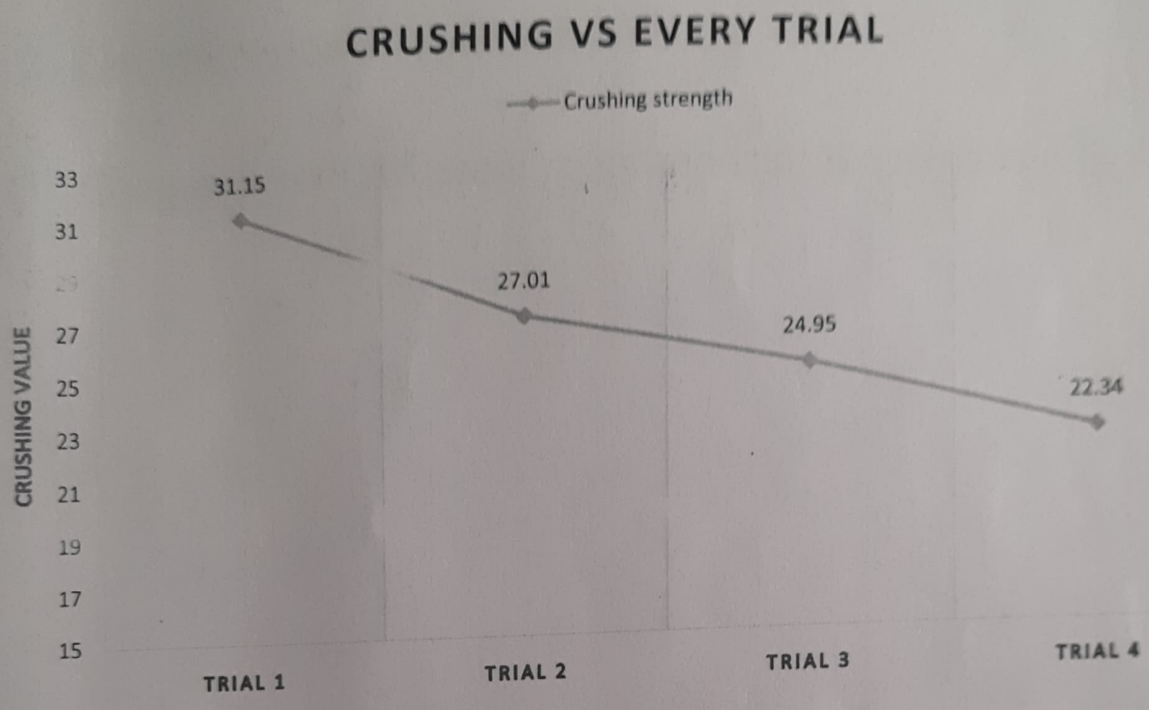
Trial 4:

20% of recycled brick is mixed with coarse aggregate by weight(530gm)

Weight of aggregate(w_1)	Weight of agg. Passing through 2.36mm sieve(w_2)	Crushing value

2640	590	22.34%

There's different crushing value at different proportions of brick aggregate in mix of conventional aggregate. To Compare with each trial and their observations.



The use of recycled brick use in conventional aggregate makes the processeconomical, this being one of the main reason so as to be cost efficient. And as perIndian Roads Congress (IRC), specified that the aggregate crushing value of the coarseaggregates to be used for cement concrete pavement surface should not exceed 30 percent.
We actually have 3 trial values of less than 30 percent. But, since we look to prioritize the crushing values between 15 and 25 and also to accord with the cost-efficient condition;

The Crushing value of recycled brick with the conventional coarse aggregate for Trail 3 – 24.95% has the optimum value and the proportion being 1:4 respectively. This implies that the mix aggregate is strong and would be able to resist heavy loads and would not wear off easily when used in a pavement.

OUTCOMES

1. Estimation of strength of the min aggregate.

2. Determination of optimum crushing value.

3. Comparison of different proportions of recycled aggregate.

CONCLUSION

1. From this test, we get optimum crushing values and also the comparison between different proportion of recycled brick aggregate with the conventional coarse aggregate and how the aggregate's strength is affected from the waste material.

2. This gives an idea how to utilize and recycle/reuse the construction waste.

3. Gives an exposure to be cost efficient as a highway engineer.

REFERENCES

1. Lab manual

2. https://ts-nitk.vlabs.ac.in/exp/crushing-value/