ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

# Experimental Study on Replacement of Aggregate with Ceramic Waste and Quarry Sand

**M.Shashivar Rao**
M.Tech Student,
Department of Civil Engineering,
Prasad College of Engineering.

**Syed Viqar Mallik**
Assistant Professor,
Department of Civil Engineering,
Prasad College of Engineering.

## ABSTRACT:

This is a cheap material, concrete, infrastructure development and its allies construction materials, are widely available in the vital nature of engineering works, including world. The widespread use and rapid infrastructure development, the natural stone and aggregates, such as total fat, there is a downside. These fine gravel and coarse gravel is the waste that can be replaced with stop are available for a higher price. Through this initiative, M20 grade concrete gravel quarrying Sand and 0% in weight total fat, 10%, 20%, from 30% to be replaced with ceramic waste. Gravel and crushed stone sieve analysis must replace ceramic and quarry waste will be conducted for dust. Experience in product mix concrete terms and in comparison with traditional concrete compressive strength. 7,21 and 28 days were carried out to evaluate the ability of these tests.

## KEYWORDS:
Specific gravity test,workability test,compressive strength,ceramic waste and quarrydust.

## I.INTRODUCTION:

The development of solid waste in the construction industry for many years. Some of the burned waste products, rice bran, saw dust, waste tires have, on garbage, glass, dust lost ash, stone and ceramic. A process for using waste product offers economy and a healthy environment.as the heat used in the production of concrete products was due yesterday. Content as possible and solid economic strength, durability, and the amount of options that have a solid product, as the possibilities to determine what sent as concrete mix design. Plastic and hardened concrete performance monitoring prupursng solid parts of the state. It can not be properly plasticnot, if practical, collect the solid. Hard concrete compressive strength, the quality and cement, the elements of water and depending on the size and mix bycg; having, compaction and treatment.

Product price, the minimum concrete structural engineer has power, who need to understand the power of the related cost of materials. Depending on the quality control measures, but it is a fact that the cost of concrete quality control. The quality control often depends on an economic trade-off, and the size and type of work. Labor costs will depend on the mix of possibilities, like, wrong result the viability of a concrete mix can lead to a degree of compaction equipment available for the high cost of labor. It is essential to take steps to structure the design mix / high strength.

## II.RELATED WORK:
## Main aspect of this project and what we do..?

In this project the fine aggregates will replaced by quarry sand and coarse aggregate will replaced by ceramic waste accordingly in the range of 0%, 10%, 20%, & 30% by weight of M-25 grade concrete. Sieve analysis is done for Ceramic waste and Quarry dust for the replacement coarse aggregate and fine aggregate. Concrete mixtures were produced, tested and compared in terms of compressive strength to the conventional concrete. For find out the strength properties of concrete, the concrete were casted, tested to evaluate the strength properties for 7, 21, 28 days Mix design aims to achieve good quality concrete at site economically.

## I. Quality concrete means:

- Better strength
- Better imperviousness and durability
- Dense and homogeneous concrete

## II. Economy:
## a) Economy in cement consumption:

It is possible to save up to 15% of cement for M25 grade of concrete with the help of concrete mix design. In fact higher the grade of concrete more are the savings.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Lower cement content also results in lower heat of hydration and hence reduces shrinkage cracks.

### b) Best use of available materials:

Site conditions often restrict the quality and quantity of ingredient materials. Concrete mix design offers a lot of flexibility on type of aggregates to be used in mix design. Mix design can give an economical solution based on the available materialsif they meet the basic IS requirements. This can lead to saving in transportation costs from longer distances.

### c) Other properties:

Mix design can help us to achieve form finishes, high early strengths for early De-shuttering, concrete with better flexural strengths, concrete with pump ability and concrete with lower densities.

## III.DESIGN MIX CONCRETE:

As the guarantor of quality of concrete used in the construction, the constructor shall carry out the mix design and the mix so designed (not the method of design) shall be approved by the employer within the limitations of parameters and other stipulations laid down by this standard. The mix shall be designed to produce the grade of concrete having the required workability and characteristic strength not less than appropriate values given in Table 2. The target mean strength of concrete mix should be equal to the characteristic strength plus 1.65 times the standard deviationMix design done earlier not prior to one year may be considered adequate for later work provided there is no change in source and the quality of the materials.

### 3.1 Concrete Grades: The concrete shall be in grades designated as per Table 2.

The characteristic strength is defined as the strength of material below which not more than 5 percent of the test results are expected to fall. The minimum grade of concrete for plain and reinforced concrete shall be as per Table 5.Concrete of grades lower than those given in Table-5 may be used for plain concrete constructions, lean concrete, simple foundations, foundation for masonry walls and other simple or temporary reinforced concrete construction.

### Table: 3.1.1Grades of concrete:

| Group | Grade designation | Specified characteristics compressive strength of 150mm cube at 28 days in N/mm^2 |
|---|---|---|
| Ordinary concrete | M10 | 10 |
| | M15 | 15 |
| | M20 | 20 |
| Standard concrete | M 25 | 25 |
| | M30 | 30 |
| | M35 | 35 |
| | M40 | 40 |
| | M45 | 45 |
| | M50 | 50 |
| | M55 | 55 |
| High strength concrete | M 60 | 60 |
| | M65 | 65 |
| | M70 | 70 |
| | M75 | 75 |
| | M80 | 80 |

### 3.2 Minimum Cement Content:

Minimum cement content been given in design to the increased risk of cracking Cement content not including fly ash and ground due to drying shrinkage in.thin sections, or to early granulated blast furnace slag in excess of 450 kg/x$ thermal cracking and to the increased risk of damage should not be used unless special consideration has due to alkali silica reactions.Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

### Table: 3.2.1 Minimum Cement Content:

| Sl no. | Exposure | Plain concrete | | | Reinforced concrete | | |
|---|---|---|---|---|---|---|---|
| | | Minimum cement content Kg/m^3 | Maximum free water-cement ratio | Minimum grade of concrete | Minimum cement content Kg/m^3 | Maximum free water-cement ratio | Minimum grade of concrete |
| 1) | Mild | 220 | 0.60 | - | 300 | 0.55 | M20 |
| 2) | Moderate | 240 | 0.60 | M15 | 300 | 0.50 | M25 |
| 3) | Severe | 250 | 0.50 | M20 | 320 | 0.45 | M30 |
| 4) | Very severe | 260 | 0.45 | M20 | 340 | 0.45 | M35 |
| 5) | Extreme | 280 | 0.40 | M25 | 360 | 0.40 | M40 |

### Table: 3.2.2 Adjustments to Minimum Cement Contents for Aggregates Other Than 20 mm Nominal Maximum Size

| Sl no. | Nominal maximum aggregate size (mm) | Adjustments to minimum cement contents (kg/m^3) |
|---|---|---|
| 1) | 10 | +40 |
| 2) | 20 | 0 |
| 3) | 40 | -30 |

### IV.Workability of concrete:

The concrete mix proportions chosen should be compacted with the means available. Suggested such that the concrete is of adequate workability for ranges of workability of concrete measured in the placing conditions of the concrete and can properly accordance with IS 1199 are given below.

### Table:4.4.1 Workability of concrete:

| Placing conditions | Degree of workability | Slump (mm) |
|---|---|---|
| Blinding concrete;<br>Shallow sections;<br>Pavements using pavers | Very low | Compacting factor will be more appropriate than slump. compaction factor value 0.75 to 0.80 is suggested |
| Mass concrete;<br>Lightly reinforced sections in slabs, beams, walls, columns;<br>Floors;<br>Hand placed pavements;<br>Canal lining;<br>Strip footings | Low | 25-75 |
| Heavily reinforced sections in slabs, walls, beams, columns; | Medium | 50-100 |

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
*A Peer Reviewed Open Access International Journal*

| | | |
|---|---|---|
| Slip form work; Pumped concrete | | |
| trench fill | High | 100-150 |
| In-situ piling Tremie concrete | Very high | In the very high category of workability measurement of workability by determination of flow will be appropriate. |

## V.CONCLUSION:

In this project work fine aggregates will replaced by quarry sand and coarse aggregate will replaced by ceramic waste accordingly in the range of 0%, 10%, 20%, & 30% by weight of M20 grade concrete. From the experiments conducted, replacement of ceramic waste as coarse aggregate and quarry dust as fine aggregates in concrete can be optimized. At 10% and 30% replacement of coarse aggregates with ceramic waste and fine aggregate with quarry dust the strength properties were decreased linearly when compared with conventional concrete. At 20% replacement of coarse aggregates with ceramic waste and fine aggregate with quarry dust the strength properties were marginally increased when compared with conventional concrete. So 20 % replacement of ceramic waste as coarse aggregate and quarry dust as fine aggregate (sand) by conventional aggregates content in concrete can be optimized and it can be used as construction purpose.

## References:

1) R M Senthamarai&P.DevadasManoharan. Have studied use of hazardous industrial waste in concrete making will lead to greener environment.
2) C. Medina a, M.I. Sanchez de, Rojas b, M. Fries b. Have studied to investigated the reuse of ceramic waste as coarse aggregate in co-efficient concretes.
3) Benito Mas. Have focuses on the use of mixed recycled aggregates (MRAs) as coarse aggregate or fine fraction in concrete and the influence of the cement used.
4) HanifiBinici. Have studied the Durability of concrete made with granite and marble as recycle aggregates.
5) Maria Chiara Bignozzi, Andrea. Saccanition (ASR) has studied Ceramic waste as aggregate and supplementary cementing material: A combined action to contrast alkali silica reaction (ASR).
6) IlkerBekirTopcu, SelimSengel. Has studied the properties of concretes produced with waste concrete aggregate.
7) J.R. Jiménez a, J. Ayuso a, M. López a, J.M. Fernández b, J. de Brito. Use of fine recycled aggregates from ceramic waste in masonry mortar manufacturing
8) Felix F. Udoeyo. studied properties of sawdust as partial replacement of cement. Before application in concrete, the ash was ground and sieved through a number 425 micron BS sieve.
9) Ali Ergun. Examined Effects of usage of diatomite and waste marble powder as partial replacement of cement on the mechanical properties of concrete.Construction and Building Materials 2011; 25:806-812.
10) Felix F.Udoeyo. Examined properties of Maize-cob Ash as filler in concrete as partial replacement of cement and Studied the Properties of sawdust as partial replacement of cement.J.Mater.Civ.Eng.2002.
11) Sani D, moriconi G, Fava G,Corinaldesi V. Examined the mechanical behavior of concrete manufactured with recycled aggregate. waste manage 2005;25:177-82.
12) Roz-Ud-Din Nassar and ParvizSoroushian. Studied The strength of recycled aggregate concrete containing milled glass as partial replacement for cement. Construction and Building Materials.2012.
13) Bashar Taha. Conducted properties of concrete contains mixed colour waste recycled glass as cement replacement.J.Mater.Civ.Eng.2009.
14) Augustine UcheElinwa and Yakubu Abba Mahmood. Studied the Ash from timber waste as partial replacement of cement.Cement&Concrete Composites 2002