International Journal of Civil Engineering
(IJCE)
ISSN (P): 2278–9987; ISSN (E): 2278–9995
Vol. 10, Issue 1, Jan–Jun 2021; 51–54

International Academy of Science,
Engineering and Technology
Connecting Researchers; Nurturing Innovations

A REVIEW ON LIME STONE & FLY ASH BASED WITH M-25 GRADE CONCRETE

Prerak Kumar Swami, Anuj Verma, Vineet Kumar & Akash

Research Scholar, Rajshree Institute of Management and Technology, Bareilly, India

ABSTRACT

Cement, sand, and granite metal have been used in the making of concrete since the beginning of time. Excessive use of these not only depletes natural resources, but also has a significant impact on the atmosphere in terms of resource. Aside from that, when quarries process layered slabs, a lot of waste stone material is dumped along the sides of roads, causing a lot of nuisance and an unsanitary environment in surrounding habitations.

Despite the fact that fly ash has superior cementitious properties, large quantities of the material sit idle near steel plants, where it is not used in concrete production.

In this study, constituent natural resources such as FA&CA in M25 grade concrete with 0, 25, 50, 75, and 100 percent and cement with fly ash up to 0, 10, 20, and 30% are substituted with waste stone aggregates in 20 different mix combinations dubbed M1 Mix to M20 Mix. To determine the fresh properties of concrete, slump tests are carried out on regular production after assessing the consistency of all materials used in concrete production. Compressive strength testing was performed after casting and curing for 28 days. 19 of the 20 mix combinations had slightly lower compressive strength than the M1 base mix, but all of the other mix combinations had compressive strength greater than the necessary characteristic strength of M 25 grades concrete.

KEYWORDS: *Concrete, Lime Stone & Fly Ash*

Article History

Received: *24 Jun 2021* | ***Revised:*** *25 Jun 2021* | ***Accepted:*** *30 Jun 2021*

INTRODUCTION

Concrete has become the world's second most widely used commodity, after water. Alternative materials for concrete manufacturing have been identified, taking into account environmental trends as well as future generations. Due to the unrestricted use of concrete, hard granite and river sand are gradually depleted.

However, concrete is only one of the most popular building materials. Cement is a necessary component of concrete, which is used in the design of both buildings and structural engineering structures. Concrete construction advancements can help the world by reducing the use of renewable resources and electricity supplies, as well as reducing pollution.

Fly ash in concrete not only efficiently disposes of large quantities of waste without polluting the atmosphere, but it also serves as a vital resource for cement, though at a low cost. Furthermore, using the right percentages of fly ash in cement increases workability, decreases permeability in concrete, reduces bleeding, improves surface finishing, and lowers hydration heat.

In light of the above, research is carried out on waste stone, which is abundant can be obtained at a low initial rate. The primary goal of the study is to substitute all concrete constituents with various blend combinations of waste stone for both CA and FA, as well as fly ash in cement.

INDIA'S LIME STONE AVAILABILITY

U P, AP, T N, Telangana, Karnataka, Rajasthan, Gujarat, and Madhya Pradesh have all recorded commercial rock deposits. Lime stone is estimated to be available in India in the amount of 93623 million tonnes. The majority of it is found in south India, and it comes in a variety of colours ranging from pink to pale green to grey, yellow, black, and blue. These meet various architectural architecture specifications for building elevations.

Table: 1 Physical Properties of Lime Stone

S. No	Content	Range
1	Lime Stone	Soft rock
2	Hardness range	3 to 4 on Mohr's scale
3	Density	Varies from 2.45 to 2.66 Kg/cm^3
4	Compressive Strength	In between 1800-2100 Kg/Sq.cm
5	Water absorption	Less than 1%

LITERATURE REVIEW

Rajput Sarvesh PS (2018) observed that Due to the shortage of natural sand, different materials must be used to replace it. Crushed stone dust, a locally useful industrial solid waste material in India, is being investigated as a fine aggregate alternative to natural sand, which is usually used in cement concrete. Conventional sand was used to make nominal mixes for cement concrete grades M-25 and M-30 according to Indian Standards codes, with Conventional Sand being replaced with crushed stone dust in various amounts. Workability by Slump cone, compaction factor tests, density tests, compressive strength tests, and ultrasonic pulse velocity tests were performed in each case proportion. The study's findings indicate that the strength properties of cement concrete made with crushed rock sand are superior to those of standard concrete. According to the research, crushed stone dust may be utilised as a readily accessible solid waste as a substitute to natural sand in cement concrete construction works, decreasing material and construction costs while also assisting in the resolution of environmental issues.

Ilangovana, R.(2008) et al experiment through The high cost of transportation from natural sources makes common river sand prohibitively costly. Depletion of these resources on a wide scale often causes environmental issues. Since river sand is becoming less available and useful due to environmental, transportation, and other restrictions, a substitution or alternative commodity for the concrete industry is needed. The most widely used fine aggregate in the manufacture of concrete, river sand, is in short supply in many places. Whose continued usage is beginning to cause serious issues in terms of supply, expense, and environmental effects. Quarry rock dust may be a cost-effective solution to river sand in this case. Quarry Rock Dust is defined as the leftover residue, tailing, or other non-volatile waste material after extracting and grinding rocks into tiny particles less than 4.75mm. Quarry rock dust is typically used as a highway surface filler and in the production of hollow blocks and lightweight concrete prefabricated components. Researchers and investigators are paying close attention to Quarry rock dust is used as a fine aggregate in concrete. This paper examines the possibility of using In concrete, quarry rock dust can be used in place of natural sand. For both traditional concrete and quarry dust concrete, mix design has been built for three grades using design an approach Indian Standard and British. On cubes and beams, the strength of concrete formed of Quarry Rock Dust was evaluated, and the findings were compared to those of Natural Sand Concrete. It was also

attempted to compare the hardness of Quarry Rock Dust and Natural Sand concrete. The compressive, flexural, and durability properties of Quarry Rock Dust concrete were determined to be around 10% greater than normal concrete.

Rashad, Alaa M. (2013) study that the aim of this experiment is to see whether using metakaolin as a fine aggregate substitute in concrete is feasible MK was used to partly replace sand at weight percentages of 10%, 20%, 30%, 40%, and 50%. A comparison mixture with a characteristic compressive strength of 30MPa was developed. Abrasion checking was performed on the specimens in compliance with Egyptian Standard specifications. Compressive power, breaking tensile strength, unit weight density, and abrasion tests lasted up to 500 days. The distinct breakdown phases that occurred were identified using X-ray diffraction (XRD). According to test results, concrete mixes' compressive strength, splitting tensile strength, and abrasion resistance improved as fine aggregate substitution with MK increased up to 40%, then declined at 50% replacement. Concrete abrasion resistance improved by about 23.12 percent, 36.18 percent, and 46.24 percent, respectively, after ages of 28, 56, and 500 days, compared to a reference mixture with 40% replacement standard.

METHODOLOGY

In this study, waste stone was utilised to determine compressive and split tensile strengths in concrete by substituting natural aggregate with 0, 25, 50, 75, and 100 percent and fly ash with 0, 10, 20, 30 percent in cement. Cubes and cylinders were cast to attain the desired strengths.

- Cubes and cylinders casting
- Slump test for workability
- Compressive strength testing of cubes
- Split tensile strength testing of Cylinders

CONCLUSIONS

- In a laboratory examination, natural granite absorbs 0.05 percent of water, while waste stone absorbs 0.15 percent, or 0.10 percent more than natural granite aggregate.
- It has the result that as the percentage of waste stone in the concrete mix increases, workability decreases and slump value decreases.
- As the proportion of alternate materials in the concrete mix increases, compressive and break tensile strength decreases.

FURTHER SCOPE OF RESEARCH

- Flexure and shear strength tests are appropriate.
- Checks for durability may be checked.
- Additional materials (silica fume, rice husk ash, etc.) may be used to complete the same task.
- This NWS aggregate concrete can be used to make geo polymer concrete, and strength and stability tests can be performed.
- These aggregates may be used to conduct temperature experiments.

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