|| Volume 6 || Issue 2 || February 2021 || ISSN (Online) 2456-0774
INTERNATIONAL JOURNAL OF ADVANCE SCIENTIFIC RESEARCH
AND ENGINEERING TRENDS

EXPERIMENTAL INVESTIGATION ON STRENGTH AND DURABILITY OF DEMOLISHED CONCRETE

Dr. P. BALA KRISHNA[1], KAMMILI GOWTHAMI[2]

Assistant Professor, Ph.D.,, MVR COLLEGE OF ENGINEERING &TECHNOLOGY, PARITALA, VIJAYAWADA[1]
M.Tech, Research Scholar, MVR COLLEGE OF ENGINEERING &TECHNOLOGY, PARITALA, VIJAYAWADA[2]

---------- ***----------

Abstract:- The concrete material has to be demolished during ongoing or old construction. The concrete waste obtained from these processes is called "Demolished Concrete". The environmental protection and for promotion of the principles of sustainable development has led to recycled aggregate. Demolished sites and restoration schemes are sources of large amounts of solid waste, which today is being used as landfill. The reusing and recycling the demolished concrete a better economy can be achieved without an effecting of environment.

In the past studies as per literature study most of the researches done only strength parameters of concrete with the help of different percentages of demolished aggregates. In this present study in addition of strength characteristics durability is also done. This project deals with the study of workability, compressive strength, split tensile strength, flexural strength and durability of concrete by replacing coarse aggregates with demolished concrete waste aggregates. The percentage replacement of demolished aggregated used in this study is 0%, 10%, 20%, 30%, 40% and 50%.

Keywords: Demolished Concrete, environmental protection, recycling, workability, compressive strength, split tensile strength, flexural strength, durability.

---------- ***----------

I INTRODUCTION

Throughout the years there has been an adjustment in the utilization of building materials. Peep and locally accessible materials, for example, shaped earth blocks, stones, cover, timber, steel, aluminum, plastics and strands of different sorts and structures have supplanted the customary and exorbitant materials. Be that as it may, every one of these materials have been created to meet explicit prerequisites of atmosphere, accessibility of talented work and explicit crude materials to influence the ideal economy.

Tremendous amounts of development materials are required in creating nations because of proceeded infrastructural development and furthermore gigantic amounts of development and destruction squanders are produced each year in creating nations like India. Destruction squanders acquired from a structure transcendently comprises of concrete, remote issue, for example, different kind of completions, claddy materials, amble, earth, steel, hard products, woods, plastics and so on. The transfer of this waste is an intense issue in light of the fact that on one side it requires gigantic space for its transfer while on the opposite side it contaminates the earth.

It is additionally important to secure and protect the regular assets like stone, sand and so on. Persistent utilization of normal assets, similar to stream and sand is another serious issue and this builds the profundity of waterway bed bringing about drafts and furthermore changing the climatic conditions. Along these lines, the practical idea was acquainted in development industry due with developing worry about the fate of our planet, since it is a colossal purchaser of common assets just as waste maker. The extent of solid rubbles is most extreme in the destruction squander. It has been accounted for by a few specialists that the squashed solid rubble can be utilized as a substitute of normal coarse totals in concrete or as a sub-base or base layer in asphalt, in the wake of isolating these from the development and destruction squanders. Some development ventures have been effectively finished utilizing the reused totals.

The procedure of expulsion of polluting influences and squashing of rubble into reasonable and wanted total molecule size can be done in a ceaseless and successive way utilizing proper mechanical gadgets, for example, jaw smashers, sway smashers, swing hammer smashers and so on. The most stamped contrast in physical properties of

reused solid total contrasted and customary total lies in its higher water retention. The quality parameters were not influenced by the nature of reused total at high water/bond proportion; be that as it may, they were influenced just when the water/concrete proportion was low A Lesser decrease in compressive quality of reused total cement is accounted for at higher water/bond proportion .The pace of solidarity improvement in concrete containing squashed concrete or squashed block is higher than that of referral concrete showing further establishing activity in nearness of fine reused total, past the 28 d of restoring .

Water ingestion of coarse and fine totals acquired from the destruction squanders must be resolved in the research facility before utilizing them in any solid blend plan. The water request of new cement made utilizing these totals is expanded, the quality and most likely the solidness of solidified cement is diminished. Hence, it isn't prescribed to utilize reused fine total for creation of value concrete. Because of high water retention of reused totals, it is here and there proposed to utilize pre-splashed totals for creation of reused concrete.

1.1 Demolition Waste Materials

In spite of the fact that development and destruction squander materials are regularly gathered under the nonexclusive term "C&D squander", the materials produced from these exercises can be very extraordinary. One explanation behind this is development exercises utilize as of now accessible assembling procedures and materials while destruction exercises frequently evacuate more seasoned structures. More established structures can contain materials never again utilized in the development business today, bringing about an alternate squander stream. A case of this is asbestos, which was a typical protection material forty years prior, yet is presently viewed as dangerous squander. Contrasts among development and destruction squander are additionally because of the idea of each procedure. Destruction methodology commonly evacuate the entire structure, bringing about 20-30 times more waste material than development exercises. Materials, for example, metal, which is once in a while squandered during the development procedure, can shape a noteworthy level of complete destruction squander when a structure is torn down. Wood, solid, block and other brick work regularly comprise over 60% of private and 80% of non-private destruction squander (Recycling Council of Ontario, 2006). At last, destruction squander is frequently debased with "paints, clasp, glues, divider covering materials, protection, and earth" (Falk and McKeever, 2004, p. 34). The nearness of these contaminants can make destruction materials hard to reuse..

1.2 Objectives of the study

The specific objectives of the present investigation are listed below.

1. To utilization of the demolished and development squander total in the new concrete as the reused concrete total diminishes the natural contamination just as giving a monetary incentive to the waste material.
2. To study the use of demolished and development squander as a substitution of characteristic coarse total.
3. To study the mechanical and physical properties of demolished and development squander total by directing test work.
4. The point of this examination is to utilize the demolished concrete waste as total in the creation of new concrete. The concrete waste is gathered from the neighborhood demolished structure.
5. The essential objective is to incite the reuse and reusing of this waste and different types of valorization with the end goal of adding to the feasible improvement of exercises in the development part.

II LITERATURE SURVEY

Vicky Gupta, Anand Patel, et al.,(2019), in this investigation Experiments were done in the exploration research facility to dissect the concrete made of halfway replacement of fine and coarse total with development and destruction squander.

From this investigation it was reasoned that quality and Durability parameters will be expanded. Cost advancement will utilize RA and RHA. Contributing towards Sustainable advancement and furthermore will be helpful for the general public assistance.

Pulakit Meshram, Ashwini R. Patil,et al.,(2019), This paper exhibits a writing audit concerning especially on the enhancement technique for RCA from development and destruction squanders. The utilization of pozzolanic materials either for surface covering of RA or intermixed inside the concrete are compelling and practical to improve the general Strength of concrete. The concise target of research will be adopt a two dimensional strategy by exploring the impact of rice husk debris with fixed extent of

reused aggregates for all the blends to assess the quality and potential auxiliary applications.

III MATERIALS AND METHODOLOGY

3.1 Cement

The crude materials required for production of Portland cement are calcareous materials, for example, limestone or chalk, and argillaceous material, for example, shale or mud. There are two procedures known as wet and dry procedures relying on whether the blending and crushing of crude materials is done in wet or dry condition. The crude materials utilized for the assembling of cement comprise of basically of lime, silica, alumina and iron oxide. These oxides interface with each other in the furnace at high temperature to frame progressively complex mixes.

In this investigation Ordinary Portland cement of 53 evaluation (ACC cement) has been secured and has been utilized.

OPC 53 Grade Cement

3.2 Coarse aggregates

Coarse aggregates are particles more noteworthy that 4.75mm yet for the most part go between 9.5mm to 37.5mm in width. They can either be from essential ,optional or reused sources. Essential or virgin aggregates are either land or marine-won. Rock is a coarse marine-won total, land-won coarse aggregates incorporate rock and squashed shake.

20mm and 12mm coarse aggregates

3.3 Fine aggregate

Fine aggregates are fundamentally sands won from the land or the marine condition. Fine aggregates by and large comprise of regular sand or squashed stone with most particles going through a 4.75mm strainer.

Fine aggregates

3.4 Demolished aggregates

The development and destruction squanders are gotten from a neighborhood assembling that has been demolished and built. The aggregates going through IS sifter 20mm and held on 12.5mm are taken. The particular gravity of tile aggregates is 2.64 and fineness modulus of 7.358. The free and compacted mass densities are 1356Kg/m3 and 1510Kg/m3 separately , and water ingestion of 0.55%.the total pounding esteem (%) and total effect esteem (%) of coarse total is 29.58 and 18.36 individually.

|| Volume 6 || Issue 2 || February 2021 || ISSN (Online) 2456-0774
INTERNATIONAL JOURNAL OF ADVANCE SCIENTIFIC RESEARCH AND ENGINEERING TRENDS

Demolished concrete aggregate

3.5 Superplasticizer

Superplasticizers establish a generally new class and improved variant of plasticizer, the utilization of which was created in Japan and Germany during 1960 and 1970 separately. They are synthetically not quite the same as should be expected plasticizers. Utilization of superplasticizers allows the decrease of water to the degree upto 30% without diminishing usefulness as opposed to the conceivable decrease up to 15% if there should arise an occurrence of plasticizers.

3.6 Tests to be conducted on the fresh and hardened concrete

Workability

1. Slump cone test
2. Compaction factor test

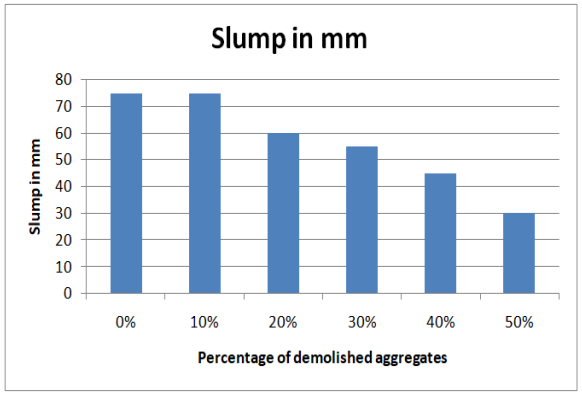
Strength of concrete

1. Compressive strength
2. Split tensile strength
3. Flexural strength

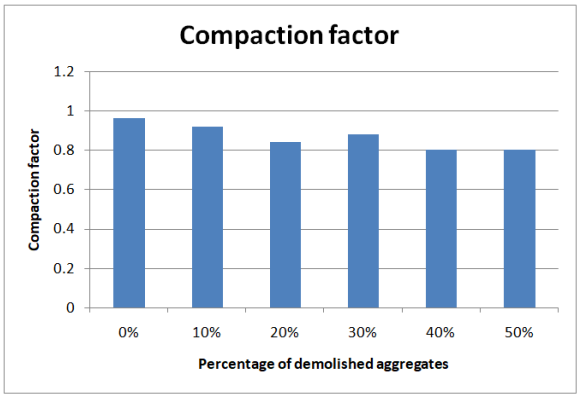
Durability of concrete

IV RESULTS AND ANLYSIS

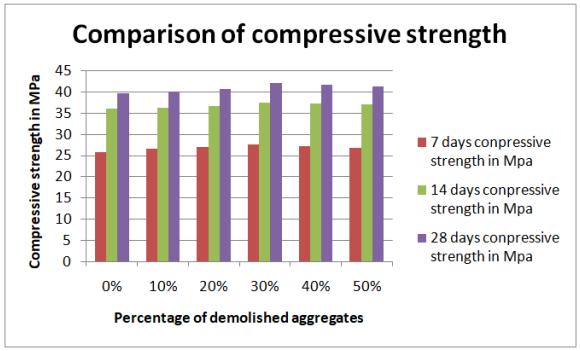
Slump cone test



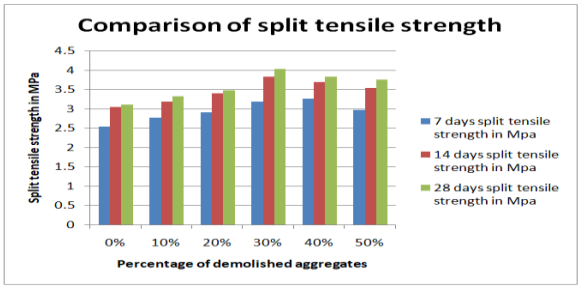
Compaction factor test



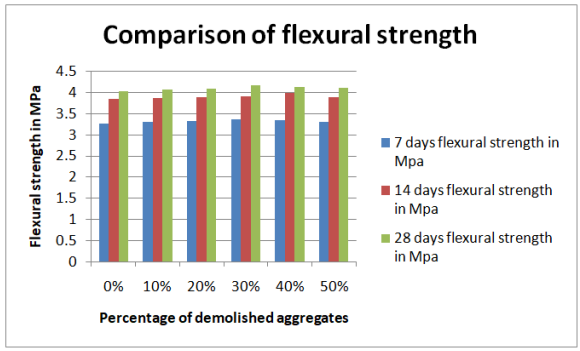
Compressive strength of concrete



Split tensile strength of concrete

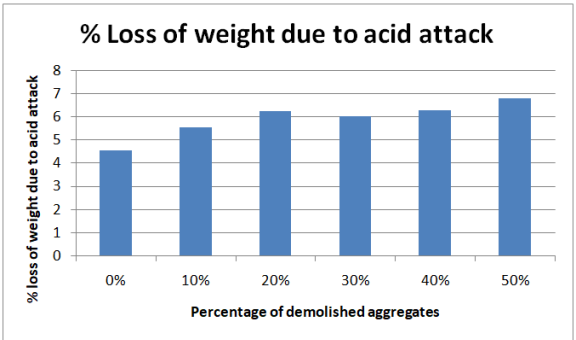


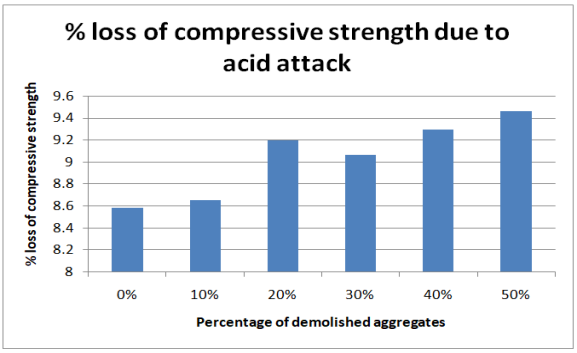
Flexural strength of concrete



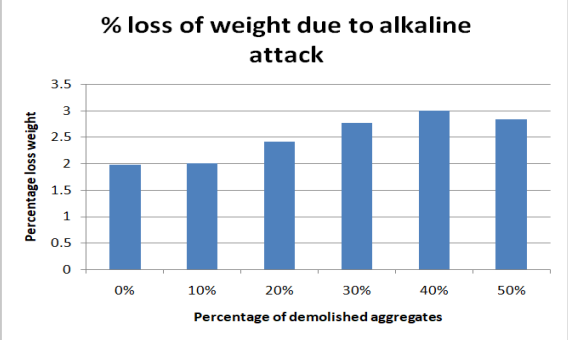
Durability of concrete

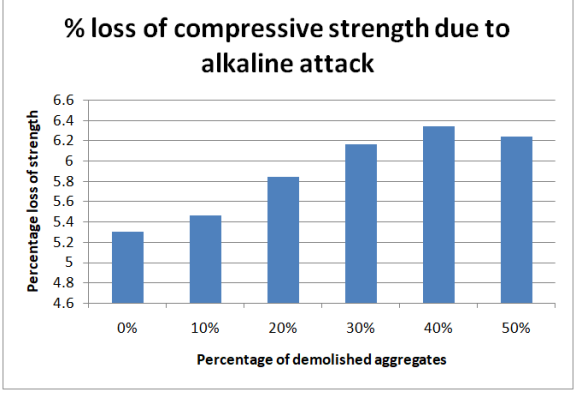
Acid attack



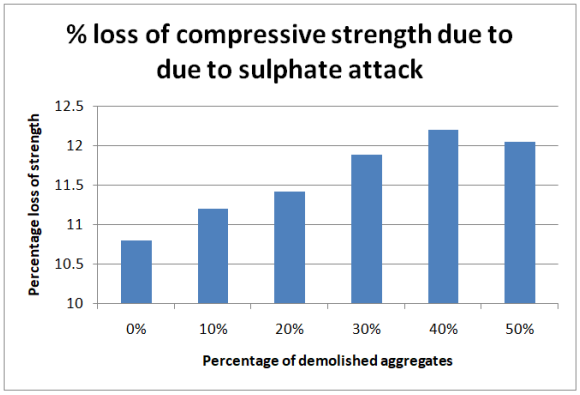


Alkaline attack





Sulphate attack



V CONCLUSIONS

From the above study the below conclusions were made:

1. The use of demolished concrete as a partial replacement of coarse aggregates provides us an alternative source to use the waste into a useful material.
2. The disposal of demolished waste can be used as a coarse aggregate provides the reduction in burden on landfill disposing and environmental pollution.
3. The demolished concrete density is less as compared with the conventional concrete which reduces the cost of the concrete and produces the light weight concrete structure.
4. Demolished concrete is generally used where the natural coarse aggregate are not available easily and bearing capacity of soil is low.
5. The value of slump decreases with increase in the percentage of demolished Waste from 0% to 50%.
6. The value of compaction factor decreases with increase in the percentage of demolished Waste from 0% to 50% .
7. Compressive strength, split tensile strength and flexural strength of the concrete is increases with increase in the percentage of demolished material from 0% to 30% after 30% demolished aggregates the value of strength decreases.
8. The percentage loss of weight due to acid attack and alkaline attack increases with increasing the percentage of demolished aggregates.
9. The percentage loss of compressive due to acid attack and alkaline attack increases with increasing the percentage of demolished aggregates.

REFERENCES

[1]. Vicky Gupta, Anand Patel, "EXPERIMENTAL INVESTIGATION OF CONCRETE ON REPLACEMENT OF AGGREGATES WITH DEMOLISHED CONCRETE WASTE", International Journal of Engineering Science Invention (IJESI) ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726 www.ijesi.org ||Volume 8 Issue 05 Series. I || May 2019 || PP 08-13.

[2]. Dr. Ramakrishna Hegde , Prof. Shrinath Rao K , Shashank H, et al.,(2019)., "A Study on Strength Characteristics of Concrete by Replacing Coarse Aggregate by Demolished Column Waste", International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181, www.ijert.org, Vol. 7 Issue 06, June-201

[3]. Nikita Patel , Dr. Piyush Patel, et al.,(2016), "Use of Demolished Concrete Materials in Concrete and Comparative Study of its Mechanical Properties: NDT Comparison", International Journal of Innovative Research in Science, Engineering and Technology, (An ISO 3297: 2007 Certified Organization) Vol. 5, Issue 4, April 2016

[4]. Shodolapo Oluyemi Franklin, Mmasetlhomo Tommy Gumede, et al.,(2014), "Studies on Strength and Related Properties of Concrete Incorporating Aggregates from Demolished Wastes", Open Journal of Civil Engineering, 2014, 4, 311-317 Published Online December 2014.

[5]. KATAM AVINASH, SRI DUMPA VENKATESWARLU, et al.,(2016), "UTILIZATION OF DEMOLISHED CONCRETE WASTE FOR NEW CONSTRUCTION", International journal of professional engineering studies, Volume VIII /Issue 1 / DEC 2016.

[6]. VEERASELVAM ,K 1, Dr. DHANALAKSHMI.G2. "UTILIZATION OF DEMOLISHED CONCRETE WASTE FOR NEW CONSTRUCTION AND EVALUATION OF ITS STRENGTH", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056, Volume: 04 Issue: 06 | June -2017

[7]. Shahiron Shahidana, Mohamad Azim Mohammad Azmib, et al.,(2017), "Utilizing Construction and Demolition (C&D) Waste as Recycled Aggregates (RA) in Concrete", 2016 Global Congress on Manufacturing and Management.