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COMPRESSIVE STRENGHT OF NATURAL STONE AGGREGATED CONCRETE WITH CURRING VARIATIONS OF SEA WATER, LONG WATER, AND RIVER AND GROUND WATER

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ABSTRAK

The increasing demand for housing today results in an increasing need for building materials as well. This raises concerns because of the depletion of raw material supplies, therefore to prevent it, modification of raw materials from waste is carried out which is one of the potential alternatives to be investigated, there are several factors that must be considered, one of which is the treatment of concrete (curing), many people do not pay attention to concrete treatment even though it is very easy, such as variations of soaking concrete with sea water, lime water, river water and groundwater, with water shortage areas being an alternative for concrete treatment.

The data collection process is carried out through stages, namely literature study, field survey, laboratory testing and at the laboratory testing stage, sand, water, coarse aggregate and compressive strength testing are carried out.

The results of the research on the compressive strength of the natural stone aggregate concrete of temples with curing variations of sea water, lime water, river water and ground water obtained the highest compressive strength of concrete with an average of 21.66 MPa of groundwater immersion while the lowest concrete compressive strength was immersed. lime water with an average of 18.66 MPa and for seawater the average compressive strength is 19.66 MPa while for river water the average compressive strength is 20.33 MPa and the results of the compressive strength of normal concrete are among them sea water 19 Mpa, lime water 20 Mpa, river water 20.666 Mpa, and ground water 22.666 Mpa the ratio of normal concrete to natural stone aggregate concrete temples, the compressive strength of concrete is higher than normal concrete for river water, groundwater and lime water, while for water immersion The compressive strength of the sea concrete with the natural stone aggregate of the temple is higher with the compressive strength of normal concrete.

Keyword : Concrete, compressive strength, curring.

BACKGROUND

The increasing demand for housing today results in an increasing need for building materials as well. Its relatively cheap price and ease of implementation make concrete even more irreplaceable in the world of construction. Along with this development, it is necessary to fulfill the raw materials that are required. This raises concerns because of the depletion of raw material supplies, therefore to prevent it, modification of raw materials from waste is one of the potential alternatives to be investigated, for example in the Prambanan area, Yogyakarta, there are many temple natural stone waste that is wasted, it is desirable. There are several factors that must be considered, one of which is the treatment of concrete (curing), many people do not pay attention to the treatment of concrete even though it is very easy, such as the variation of soaking concrete with sea water, lime water, river water and groundwater, in areas that are lacking water can be an alternative for concrete treatment.

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This final project will examine the Compressive Strength of Aggregate Concrete in Temple Natural Stone with Curring Variations of Sea Water, Lime Water, and River Water and Groundwater.

OBJECTIVE

Based on the problem formulation above, this study aims as follows :

1. Knowing the compressive strength of concrete with treatments using sea water, lime water, river water and ground water.
2. Knowing the comparison of the compressive strength of natural stone aggregate concrete of temples with treatments using sea water, lime water, river water and groundwater with normal concrete compressive strength.

REVIEW

Concrete is a material consisting of a mixture of cement, water, coarse aggregate, fine aggregate, with or without additives. Concrete is a construction material that is often used in the field of Civil Engineering, such as in buildings, bridges, roads, and others.

In general, the growth or development of the construction industry in Indonesia is quite rapid. Nearly 60% of the material used in construction work is concrete, which is generally combined with steel (composite) or other types.

THEORETIC

With the development of technology in the field of construction, concrete is one of the most widely used building materials. Concrete itself is a homogeneous mixture of cement, water and aggregate. In general, concrete consists of approximately 15% cement, 8% water, 3% air, the rest is sand and gravel (Wuryati and Candra, 2001). The characteristic of concrete is that it has high compressive stress and low tensile crush stress. The use of concrete construction is in demand because concrete has beneficial properties, such as its resistance to fire, durability, high compressive strength and in practice it is easy to form according to the desired shape. But concrete construction also has weaknesses, including the ability to withstand low tensile strength so that the construction cracks easily if it gets tensile stress.

METHODOLOGY

The data collected at this stage include:

a. Potential local material availability as a substitute for coarse aggregate.
b. The price or cost range of these local materials.
c. Possible applications of these materials as construction materials.

Laboratories Testing

Laboratory testing is carried out to determine some of the mechanical and physical properties of each concrete building material. Some of the tests carried out in the building materials laboratory of the Sarjanawiyata Tamansiswa University include :

a. Testing sea water, lime water, river water, groundwater to find out the contents in the water.
b. Sand testing.
c. Testing of mixing natural stone waste with sand and cement to find a mix design. Testing in the form of a trial (experiment) to find a mix design formula is done by making several variants of the mixture with the percentage of coarse aggregate, fine aggregate, cement, cement water factor ,. The results of the concrete mix from several variations are then printed in a concrete cylinder for compressive strength testing.

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Compression Strength's Testing

The compressive strength test was carried out at the age of 14 days. It is expected that the compressive strength at the age of 14 days has reached a range above 60%. This test is carried out on a cylinder that has been printed in the previous process. The cylinder mix design formula which has the highest compressive strength is then used as a formula.

In this stage, after conducting a field survey, the collected data is used as a reference for testing the formulation of the concrete strength design.

Tabel 1 Spesimen of Research Testing

No	Concrete Silinder	Water Threathment	Care Methods	Number of Spesimen
1	A4	River water	immersion	3
2	B	Lime water	immersion	3
3	C	Soil water	immersion	3
4	D	Sea water	immersion	3

RESULT AND DISCUSSION

Density of sand

The sand in this determination comes from Kali Progo, Kulon Progo Regency, Yogyakarta Special Region, obtained the following amount.

Tabel 2 Density Testing

No	Observation	Gram
1	Sand weight + tube of distance + water (A)	1200
2	Sand weight SSD (B)	300
3	The tube of distabce weight + water (C)	1050
4	Density of normally driyer (D)	270

1. Weight

$$= \frac{D}{\{(1050 + 300) - 1200\}}$$

$$= \frac{270}{150}$$

$$= 1{,}8$$

2. Sand density SSD

$$= \frac{B}{\{(C + B) - A\}}$$

$$= \frac{300}{\{(1050 + 300) - 1200\}}$$

$$= \frac{300}{150}$$

$$= 2$$

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COMPRESIVE STRENGHT

Concrete compressive strength testing is carried out after 14 days of treatment. The specimen is a concrete cylinder with dimensions of 150 mm x 300 mm. The number of concrete cylinders tested were 12 cylinders with different treatments, including 3 specimens for sea water, 3 lime water, 3 groundwater, and 3 for river water.

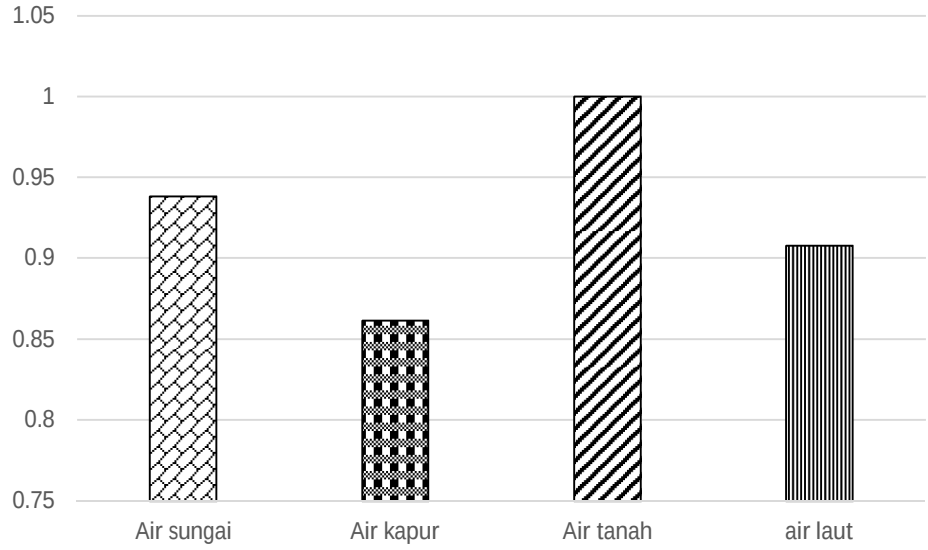

Fig. 2 Compressive strength ratio.

From the test results above, it can be seen that the compressive strength of concrete is the highest with an average of 21.66 MPa of groundwater immersion, while the compressive strength of concrete is the lowest with immersion of lime water with an average of 18.66 MPa and for sea water it is produced strong. The average compressive strength is 19.66 MPa, while for river water the average compressive strength is 20.33 MPa.

CONCLUISON

The compressive strength of natural stone aggregate concrete of temples with curing variations of sea water, lime water, river water and groundwater shows that the compressive strength of concrete is the highest with an average immersion of 21.66 MPa while the compressive strength of concrete is the lowest with Soaking lime water with an average of 18.66 MPa and for sea water an average compressive strength of 19.66 MPa is produced, while for river water it produces an average compressive strength of 20.33 MPa. And the results of normal concrete compressive strength with variations in curing sea water, lime water, river water and ground water are not much different in compressive strength, namely sea water 19 MPa, lime water 20 Mpa, river water 20.666 Mpa, and ground water 22.666 Mpa.

Comparison ratio between normal concrete and natural stone aggregate for temple, the compressive strength of concrete is higher than normal for river water, groundwater and lime water, while for seawater immersion the compressive strength of concrete with natural stone aggregate is higher with normal. concrete.compressive strength.

REFERENCES

Aryansah Pratama, Willy dkk. 2013,*Perbandingan Kuat Tekan Antara Beton Dengan Perawatan Pada Elevated Temperature & Perawatan Dengan Cara Perendaman Serta*

Tanpa Perawatan Perbandingan Kuat Tekan Antara Beton Dengan Perawatan Pada Elevated Temperature & Perawatan Dengan Cara Perendaman Serta Tanpa Perawatan. Tanpa penerbit

http://eprints.polsri.ac.id/kuattekanbeton

http://e-jurnal.uajy.ac.id/batualamcandi/pdf

http://jurnal.ugm.ac.id/mgi/airsungai/pdf

Habeahan, Pardi ,dkk .2012."*Pengaruh tentang Perawatan (Curing) Pada Beton Dengan Limbah Abu Boiler Pabrik Kelapa Sawit (Pks) Sebagai Substitusi Semen Terhadap Kuat Tekan Beton* .Tanpa penerbit

Nurlina, Siti dkk. 2013,*Uji Kuat Tekan Campuran Beton Dengan Limbah Batuan Pabrik Pengrajin Batu Alam Junrejo, Kota Batu.* Tanpa penerbit

Purwandari, Titin dkk.2016,*kuat tekan beton menggunakan bahan agregat modifikasi.* Tanpa penerbit

SNI,2011, *Tata cara perawatan daan pembuatan mix desain benda uji*