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RESEARCH ARTICLE

MIXTURING OF LUMAJANG'S SAND AND BANGKALAN'S GRAVEL FOR 20 MPA QUALITY CONCRETE, REVIEWED FROM QUALITY MANAGEMENT.

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Abstract

Bangkalan Regency has an aggregate that has the potential to use a concrete mixture in the form of sand and gravel. SandBangkalan Regency has an aggregate that has the potential to use a concrete mixture in the form of sand and gravel. Bangkalan sand has a very fine structure, so this material is rarely used as a mixture of concrete because with its fine structure the quality of the resulting concrete will be less good. Repairing gradations or combinations of 10/20 with 5/10 gravel from Bangkalan Regency and the use of sand from Lumajang Regency are expected to reach fc '20 Mpa quality concrete. This study aims to obtain compressive strength of concrete using Bangkalan gravel mixture and Lumajang sand compared to using Bangkalan gravel in terms of quality management using statistical tests, an average of two and an average of three. The study was carried out in the laboratory, to obtain the compressive strength of a cylinder using a specimen size of 15 cm x 30 cm each variation of 30 specimens for quality concrete fc '20 Mpa, Variation 1 combination of use of gravel size 5/10 and 10/20 and sand from Bangkalan, variation 2 uses lumajang sand as a substitute for Bangkalan sand. The results of statistical tests using an average test of two and an average of three concrete using sand and gravel from Bangkalan did not meet the satisfactory concrete quality of 26.70 Mpa because the characteristic concrete compressive strength only reached 15.62 Mpa. While concrete using sand from Lumajang and gravel from Bangkalan at 23.79 MPa. However, when viewed from the compressive strength of the concrete characteristics using Lumajang sand and Bangkalan gravel it has reached a quality of 20 Mpa.

Introduction:-

Madura Island is a developing area that is currently doing a lot of development, which is a building made of reinforced concrete. Many can be used as one of the concrete originating from the Bangkalan area, Madura which is rich in concrete-making materials, which are quite abundant in sand and gravel. However, because Bangkalan sand has very fine grains, this material is rarely used as a paint material because the fine quality will be less good, and residents in Bangkalan Regency prefer to bring in sand or gravel as Java Island, for example from Lumajang famous for the quality of sand which is very good as a concrete mixture. At present, sand excavation in Java, especially Lumajang sand, which has good quality is not possible. The use of sand and gravel from Bangkalan Regency to convert concrete, so that the physical properties of the aggregate need to be done, can determine the location that can

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be used for concrete measurements. Julistiono Handojo and Handoko Sugiharto(2004) stated that the use of Madura gravel originated from Peterongan, Torjun, and Omben. Usually it can use the same physical properties of gravel as gravel from Mojokerto or Pasuruan. The use of Peterongan, Torjun and Omben gravel to mix the design of 225kg / cm^2, Paterongan Gravel and Omben are recommended only for concrete rebates, while the gravel from Torjun allows it to be able to make structures with improved gradations. Avilatus Saadha and Karyoto's research (2015) stated that with the planned 20Mpa concrete compressive strength the results of concrete compressive strength using the Langkap sand Bangkalan District, Bangkalan Regency obtained concrete compressive strength of 15.73Mpa. Heri Sujatmiko's research (2015) states that by using FAS 0.55 and 0.6, the results show that Limestone waste can be used as coarse aggregates in concrete mixtures. Besides that, FAS greatly influences the compressive strength of the resulting concrete, where with the cement water factor higher will reduce the compressive strength of the concrete. Moch. Hazin Mukti's, Taurina Jenny Irwanto (2014) stated that the compressive strength concrete of the plan was 15-25 MPa. From the results of the study it was obtained that the maximum concrete compressive strength using broken rocks of Java Island reached 32 Mpa while using broken stone Madura Island reached 28 MPa. Dewi Pertiwi's, Siti Choiriyah research (2017) obtained the results of concrete compressive strength using aggregates from Bangkalan Regency with a maximum of 14.41 Mpa with a cement water factor of 0.4. In this case the concrete compressive strength using aggregates from Bangkalan Regency had not reached normal concrete due to sand grains are too smooth. Research by Dewi Pertiwi, Siti Choiriyah (2017) obtained concrete compressive strength with Lumajang sand composition of 10% + 90% Bangkalan sand compressive strength 21.567 Mpa, Lumajang sand 20% + 80% Bangkalan sand 24,120 Mpa, Using Lumajang sand composition 10% -20 % and Bangkalan sand 80% -90% meets the determined compressive strength of 20 Mpa. In this research, concrete specimens will be made with fine aggregates and coarse aggregates of 5/10 and 10/20 sizes from Bangkalan Regency and fine aggregates from Lumajang Regency with coarse aggregate size 5/10 and 10/20 from Bangkalan with concrete compressive strength plan f'c 20 Mpa. The results of the concrete compressive strength were tested using the two and three mean statistical tests.

Methodology:-

In this study, a laboratory research was conducted in the form of sludge content testing, sieving analysis, the specific gravity of sand and gravel wear, which was taken from Bangkalan Regency. Which will be made concrete and tested the compressive strength of concrete with variations 1. Fine aggregate and coarse aggregate size 5/10 and 10/20 from Bangkalan Regency Fine aggregate variations from Lumajang Regency and coarse aggregates measuring 5/10 and 10/20 from Bangkalan Regency to the mixed concrete .To find out the quality of concrete, the concrete compressive strength was tested at the age of 7.14 and 28 days and evaluated by a two-and-three-mean statistical test.

Results and discussion:-

Aggregate physical testing:-

Table 1:-Physical Test Results of Lumajang Sand

No	Experiment	Lumajang Sand	Standart ASTM	Information
a	Moisture	1,50%	1 - 5%	Comply
b	Spesific Gravity	2,70 gr/cm^3	1,60 – 3,30 gr/cm^3	Comply
c	Infiltration Water	2,36%	1% - 5%	Comply
d	Volume Weight (Release)	1,45 kg/dm^3	0,4 - 1,9 kg/dm^3	Comply
e	Volume Weight (Rojok)	1,56kg/dm^3	0,4 - 1,9 kg/dm^3	Comply
f	Sludge levels	2,5 %	Maks 5%	Comply
g	Organic Content	No.3	No.3	Comply
h	Filter Analysis	Zona 2 (Fm = 2,37)	2,0 < Fm <3,1	Comply

Table 2:-Results of Physical Education in Bangkalan Sand

No	Experiment	Lumajang'Sand	Standart ASTM	Information
a	Moisture	9,40%	1 - 5%	Not Comply
b	Spesific Gravity	1,67 gr/cm^3	1,60 – 3,30 gr/cm^3	Comply
c	Infiltration Water	4,43%	1% - 5%	Comply
d	Volume Weight (Release)	1,06 kg/dm^3	0,4 - 1,9 kg/dm^3	Comply
e	Volume Weight (Rojok)	1,18kg/dm^3	0,4 - 1,9 kg/dm^3	Comply
f	Sludge levels	22,3 %	Maks 5%	Not Comply

g	Organic Content	No.3	No.3	Comply
h	Filter Analysis	Zona 1 (Fm = 3,99)	2,0 < Fm <3,1	Not Comply

Table 3:-Physical Test Results for 10-20 Bangkalan Gravel

No	Experiment	Gravell 10-20	Standart ASTM	Information
a	Moisture	1,95%	1 - 5%	Comply
b	Spesific Gravity	2,97 gr/cm^3	1,60 – 3,20 gr/cm^3	Comply
c	Infiltration Water	1,06%	Max 4%	Comply
d	Volume Weight (Release)	1,32 kg/dm^3	0,4 - 1,9 kg/dm^3	Comply
e	Volume Weight (Rojok)	1,54kg/dm^3	0,4 - 1,9 kg/dm^3	Comply
f	Sludge levels	1,75 %	Maks 1%	Not Comply
g	Organic Content	Fm = 7,97	6,5< Fm <8,0	Comply

Table 4:-Results of 5-10 Bangkalan Gravel Physical Tests

No	Experiment	Gravel 5-10	Standart ASTM	Information
a	Moisture	1,05%	1 - 5%	Comply
b	Spesific Gravity	2,62 gr/cm^3	1,60 – 3,20 gr/cm^3	Comply
c	Infiltration Water	1,68%	Max 4%	Comply
d	Volume Weight (Release)	1,33 kg/dm^3	0,4 - 1,9 kg/dm^3	Comply
e	Volume Weight (Rojok)	1,54kg/dm^3	0,4 - 1,9 kg/dm^3	Comply
f	Sludge levels	2,2 %	Maks 1%	Not Comply
g	Organic Content	Fm = 5,74	4,0 < Fm < 6,0	Comply

Figure1:-shows that concrete using a mixture of sand and gravel from Bangkalan has a concrete compressive strength of 15.62 Mpa while the concrete mixture using Lumajang sand and Bangkalan gravel has a compressive strength of 23.79 MPa this is due to Bangkalan's fine aggregate granules too smooth and contains high levels of sludge.

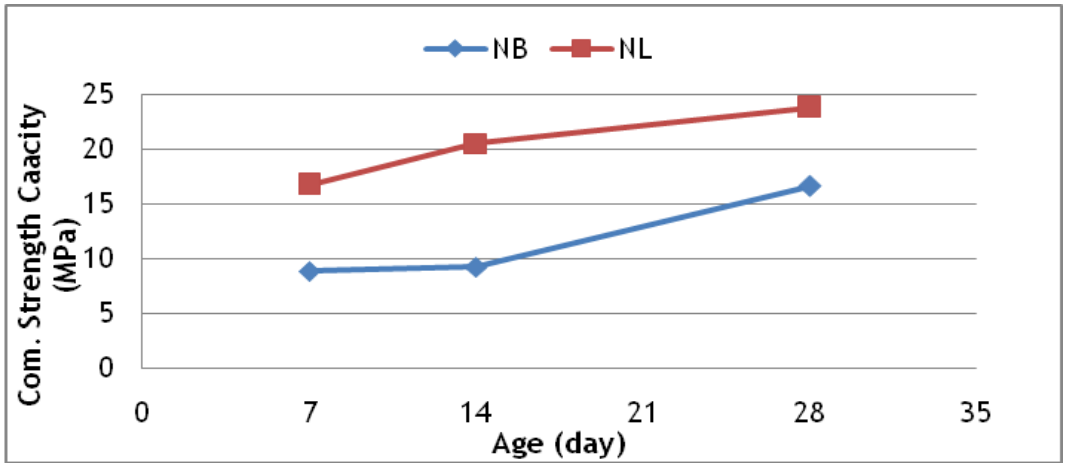

Figure 1:-Graph of comparison of Concrete Compressive Strength

Statistical tests with a mean of two and averages of three
Strong Analysis of Concrete Press using sand + gravel size 5/10 and 10/20 Bangkalan

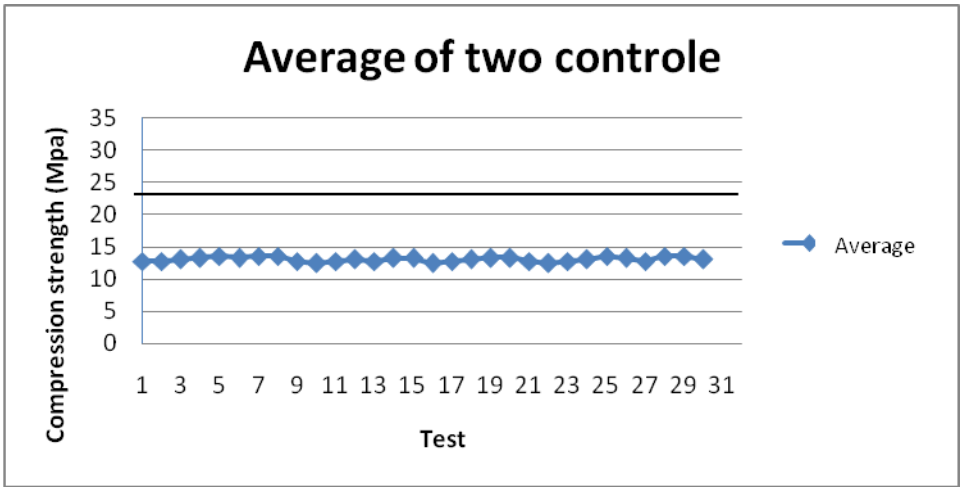

Figure 2:-Average graphics of two concrete mixtures Sand + gravel size 5/10 and 10/20 Bangkalan

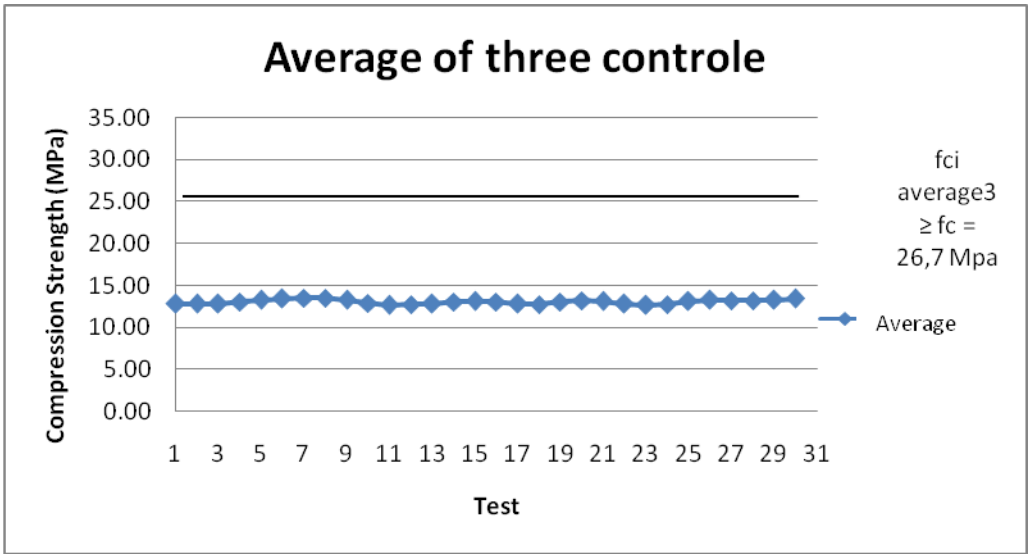

Figure 3:-Average graphics of three concrete mixtures Sand + gravel size 5/10 and 10/20 Bangkalan

Strong Analysis of Concrete Press using Lumajang sand + gravel size 5/10 and 10/20 Bangkalan:-

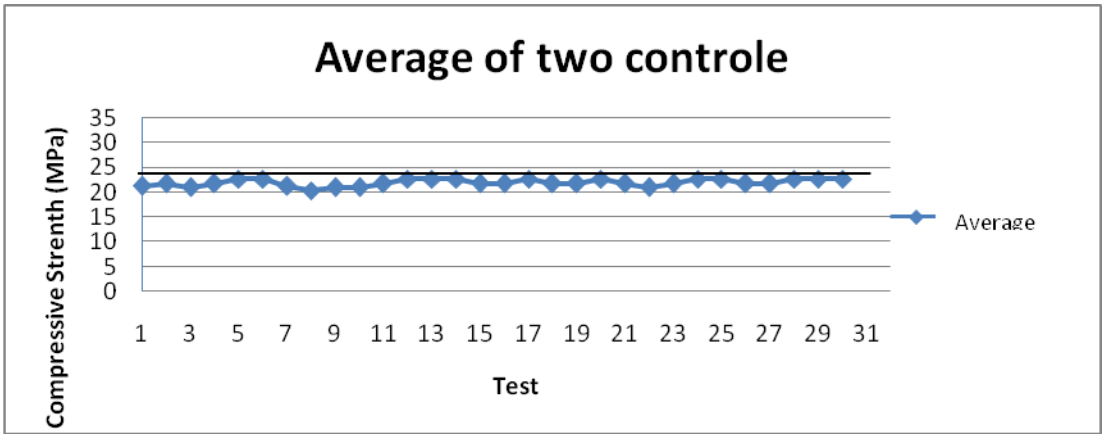

Figure 4:-Graph average of two concrete mixtures of Lumajang Sand + gravel size 5/10 and 10/20 Bangkalan

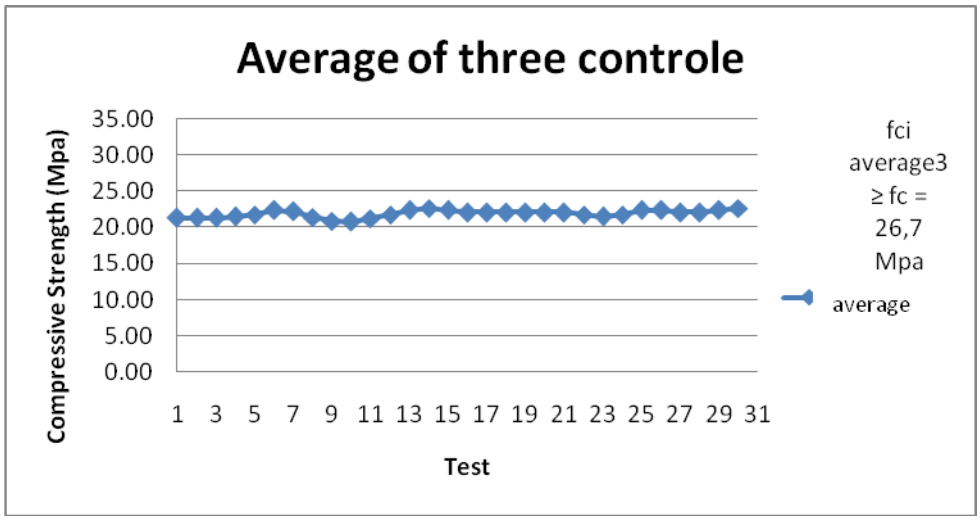

Figure 5:-Graph average of three concrete mixtures of Lumajang Sand + gravel size 5/10 and 10/20 Bangkalan

Conclusion:-

1. Based on the results of the above research, the following conclusions were takenCharacteristic concrete compressive strength using sand and gravel size 5/10 and 10/20 from Bangkalan Regency at 15.62 Mpa, Concrete has not reached 20 Mpa quality
2. The compressive strength of the concrete characteristics using sand from Lumajang and gravel size 5/10 and 10/20 from Bangkalan Regency is 23.79 MPa, the concrete has reached 20 Mpa quality.
3. The results of statistical tests using a test of two averages, three averages, concrete using sand and gravel from Bangkalan and concrete using Lumajang sand and Bangkalan gravel did not meet satisfactory concrete quality 26.70 Mpa due to characteristic concrete compressive strength only reached 15.62 Mpa and 23.79 Mpa.

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