

ANALYSIS OF THE COMPRESSIVE STRENGTH OF CONCRETE WITH TRAS AS A PARTICULAR REPLACEMENT OF FINE AGGREGATES

Teguh Haris Santoso¹, Teguh Wijaksono²

¹ Lecturer of Civil Engineering, Faculty of Engineering and Science Computer, Pancasakti University Tegal

² Civil Engineering Student, Faculty of Engineering and Science Computer, Pancasakti University Tegal

Contact Person:

Teguh Haris Santoso

Jl. Indraprasta 5 Perum Bina Griya Utama - Kalisapu Slawi

Tel. +62 82328700543, E-mail: tesant73@gmail.com

Abstract

Teguh Wijaksono, 2023 “ Strong Value Analysis Press Concrete With Tras As Partial Aggregate Replacement Smooth ”. Report Civil Engineering Thesis Faculty of Engineering and Science Pancasakti University Computer Tegal.

Concrete conventional is something component of the most important structure in A building. Something structure column designed For Can withhold burden axial press. Tras or *pozzolan* is some type of material originating excavations _ from material weathering of volcanic deposits. Utility Tras is for raw brick, the cement industry, mixed material buildings, and natural cement. Problems study This is How to influence strong pressure on the concrete with the use of tras with percentages of 25%, 50%, 75%, and 100% of big sand. Manufacturing of 36 test pieces started with planning mix design and material testing, for strength test press concrete at the age of 7 days, 14 days, and 28 days. Research results at the age of 7 days in all variation obtained mark strong press concrete highest with the percentage of 25% on Tras 1 Test Objects and Tras 2 Test Objects with yield 16.60 MPa for Tras originate from Village Tuwel and Village Sridadi, for results study at 14 days of age in all variation obtained mark strong press concrete highest with the percentage of 100% on Tras 1 Test Objects with yield 24.63 MPa for Tras originate from Village Tuwel, And for results Study at 28 days of age in all variation obtained mark strong press concrete highest with the percentage of 75% on Tras 3 Test Objects with yield 28.63 MPa for Tras originate from Village Pringamba.

Keywords: aggregate, concrete, strong press, tras

INTRODUCTION

So far what we know about conventional concrete is the most important structural component in a building. A column structure is designed to withstand axial compressive loads. Conventional concrete in its manufacture is planned, all concreting work is done manually by assembling reinforcement in the building made, with concrete components that are familiar, namely cement, aggregate, air, and added materials, for example, additives that can act as reinforcement or acceleration. With the presence of an additional component in a concrete component, we can make a concrete research innovation with Tras as a partial replacement for fine aggregate.

With that, we must first know what Tras is.

Tras or pozzolan is a type of mineral derived from the weathering of volcanic deposits. Tras is also called puzolan because it was first discovered by the ancient Romans. At that time the ancient Romans made buildings. The pozzolan used is in the form of minerals, a fine mixture of volcanic ash originating from the area near Pozzuoli. Therefore the Romans named this mineral with the name pozzolan material.

Tras contain material silica 40-56%, iron, and aluminum do not have characteristic cementing, however in form powder smooth, and when

mixed with water can react with calcium hydroxide at a temperature room and shape compounds that have cement properties, i.e. experience characteristic of hardening after hard No late in water. Something material excavation can classified as Tras natural if have composition chemistry as required by ASTM C 618-78.

Based on the description above, research __ This expected to have a very big influence On the utilization of Trash, not only just Tras easy to get or the price very affordable but also Tras containing _ material silica, iron, and aluminum when mixed __ with water can react and form characteristic like cement and deliver mark more on strength concrete. Tras will used For substitution replacement component aggregate fine that is sand, where sand is one _ from several components from composer concrete. For That will research How to influence Tras that replaces part later sand _ This will done by making as much three concrete test objects with substitution of 25%, 50%, 75%, and 100% of heavy sand.

THEORETICAL BASIS

1. Concrete

SNI 03-2834-2000 defines concrete as mixture of either Portland cement or other hydraulic cement, fine aggregate rough and water with or without material plus form mass solid. The properties of concrete depending on the properties of material constituent, proportion ingredients composer, way mixing, pouring, compaction, and curing during the hardening process. Along with development technology and needs society, experts make an effort For increase properties concrete among others, *workability, placeability, strength, durability, permeability, and corrosivity*.

Classification concrete generally done based on heavy kind and strong press it . Based on heavy kind , concrete shared on concrete light weight , normal concrete , and concrete heavy . Concrete light own

4. Aggregate Fine

Aggregate fine must consists on field materials _ rough angular , sharp and

heavy type below 1800 kg/m³ , normal concrete has heavy type 2400 kg/m³ , and concrete heavy own heavy type above 3200 kg / m³ based on strong press it , concrete categorized as concrete quality low , concrete quality medium , and concrete quality high .

- Concrete quality low with strong press concrete below 20 MPa.
- Concrete quality currently with strong press concrete 20-40 MPa.
- Concrete quality tall with strong press concrete above 40 MPa.

2. Portland Cement

Cement is something material reacting binder _ when mixed with water. Cement is produced from burning lime and materials mixture other like sand silica and soil clay at a temperature high. The result of the burning material of the main cement is solved and becomes fine details.

_ There are various types of cement type, but is the most commonly used is ordinary Portland cement. Content major portland cement is *Tricalcium silicate* (3 CaO.SiO₂) or (C3S), *Dicalcium silicate* or (C2S), *Tricalcium aluminate* or (C3A), *Tetracalcium aluminoferrite* or (C4AF), CaSO₄, CaO , MgO. C is *calcium oxide* (CaO), S is *silicate oxide* (SiO₂), A is *aluminum oxide* (Al₂O₃) and F is *ferrite oxide* (Fe₂O₃).

3. Aggregate Rough

Aggregate rough is gravel as results disintegration from rocks experience or in the form of crushed / split stone produced from industry stone breaker , with form size between 4.76mm — 150mm. Aggregate rough This is worn together with binding media To form something hydraulic cement concrete or stir .

Aggregate rough is gravel as results disintegration experience from rock or in the form of crushed stone obtained from industry stone breaker and have size grain between 4.75 mm (No.4) to 40 mm (No. 1½ inches) SNI 1970-2008.

clean from dirt or other ingredients that are not desired . Aggregate fine Can consists on sand clean and ingredients fine

results rock fragments or combination from ingredients the in circumstances dry . Aggregate fine must fulfil condition as following :

- a. Heavy type aggregate minimum pseudo must be 2.5% (Regulation No. 13/PT/B1987/ Ditjen Bina Marga).
- b. *Sand equivalent* value not enough of 50% no allowed in mixed (80% plus good) (Regulation No. 13/PT/B1987/ Directorate General of Highways)

Aggregate according to Silvia Sukirman, 2007 is a component main from structure pavement roads, that is 90-95% aggregate based on percentage by weight, or 75-85% aggregate based on volume percentage. Thus, quality pavement roads also determined from characteristic aggregate and yield mixture aggregate with other materials.

5. Water

Water is an important material from concrete Because That participates actively in reaction chemistry with cement. Because of that help form gift gel cement strength, quantity and quality of water required to see carefully. There has been enough discussion about the quantity of water mixing however so far This water quality has not yet been discussed. In practice, very frequent control is excellent on cement and aggregate properties done, however, control of water quality is frequently neglected because water quality affects power, necessary for Us To enter into the water purity and quality.

6. Tras

Tras is a rock mountain fire that has experienced a change in composition chemicals caused by weathering and influence bottom water conditions ground. Material excavation This colored white yellowish until white brown, compact and solid so that material This rather difficult to excavate with simple equipment. Tras also known as pozzolan, is material enough excavation _ Lots roar silica

amorphous 40-56% which can or soluble in water in a solution sour. *Pozzolan* name taken from something village Pozzuoli de Napel, Italy where the material was found. Tras nature in general formed from rock lots of volcanoes contain *feldspar* and *silica*, including breccia, andesite, granite, rhyolite which has been experienced weathering. As a result of the feldspar weathering process will change into kaolin clay minerals and compounds silica amorphous .

RESEARCH METHODOLOGY

Study done with method Experiments conducted at the Laboratory of PT. Get up Anegerah Archipelago Concrete , Village Tambangreja , Kec. Lebaksiu , Kab. Tegal, Central Java. Concrete with tras as replacement part aggregate fine with percentage of 25%, 50%, 75%, and 100% of heavy sand with testing strong press concrete at the age of 7 days , 14 days , and 28 days.

1. Method Data Collection

Instrument in study this is generated data in the form of material and strong test data press concrete . Observation done with method observation in a manner direct and testing later materials _ data results are recorded For document research .

2. Data Analysis Methods

- a. Testing material gradation .
- b. Testing rate material sludge .
- c. Testing heavy material content .
- d. Testing heavy material type and absorption .
- e. Planning.
- f. Testing strong press concrete .

3.Flow Chart Study

In A study what we can be certain of is have stages in start something study that is with making flowcharts _ where diagrams are useful For now channel in A research, especially in step or research process , for Thder This is a flowchart study as follows:

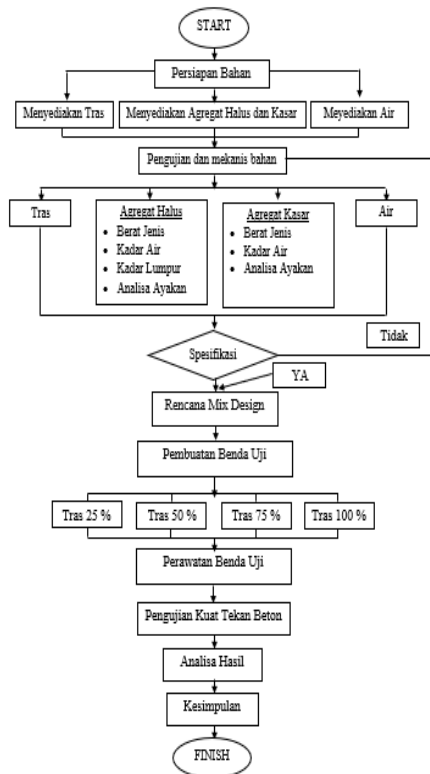


Figure 1. Research Diagram

RESULTS AND DISCUSSION

1. Need Concrete

Before making a test object for making plan target mix of _ _ calculations performed _ For need material per m^3 is as follows:

- Water = 190 Liters
- Portland Cement = 375 Kg/m^3
- Sand = 335 Kg/m^3
- Gravel = 932 Kg/m^3

2. Testing Material Material. testing This aim, For now, quality of concrete materials

a. Mud Content Test

- Sand = 1.85 %
- Gravel = 0.48 %
- Tras = 0.44 %

b. Water Content Test

- Sand = 0.90 %
- Gravel = 0.35 %

c. Gradation

- Sand = Attached
- Pebbles = Attached

d. Abrasion = 26.65 %

e. Heavy type and absorption .

- Tras = 2.31 and 0.21

3. Slump value

Slump Test		
No	Variasi	Nilai Slump (mm)
1	Tras 25 %	8,5
2	Tras 50 %	9,5
3	Tras 75 %	10,2
4	Tras 100 %	10,5

4. Testing Strong Press concrete .

Testing This there is mark strong press normal and grade concrete strong press concrete tras with percentage of 25%,50%,75% and 100% on as following :

Variasi	Umur	Nilai Kuat Tekan(Mpa)			Rata-Rata
		BU. 1	BU.2	BU.3	
BN	7 Hari	21,19	20,05	20,05	20,43
Tras 25%	7 Hari	16,6	16,6	15,64	16,28
Tras 50%	7 Hari	14,88	13	12,04	13,31
Tras 75%	7 Hari	15,64	14,88	15,64	15,38
Tras 100%	7 Hari	13,17	11,45	12,03	12,22
BN	14 Hari	26,92	22,91	25,77	25,2
Tras 25%	14 Hari	20,05	19,47	20,05	19,58
Tras 50%	14 Hari	18,9	18,32	17,17	18,13
Tras 75%	14 Hari	20,05	18,32	19,47	19,28
Tras 100%	14 Hari	24,63	22,91	24,06	23,86
BN	28 Hari	37,07	36,66	36,66	36,79
Tras 25%	28 Hari	21,19	20,05	18,9	20,04
Tras 50%	28 Hari	20,05	18,9	19,47	19,47
Tras 75%	28 Hari	28,08	25,77	28,63	27,48
Tras 100%	28 Hari	26,92	25,77	22,91	25,2

CONCLUSION

From the results of research and discussion, then can be taken conclusion as following :

- Research results at the age of 7 days in all variation obtained mark strong press concrete highest with percentage of 25% in BU. Tras 1 and Tras 2 Test Objects with yield 16.60 MPa for Tras originate from Village Tuwel and Village Sridadi .
- Research results at the age of 14 days in all variation obtained mark strong press concrete highest with percentage of 100% on Tras 1 Test Objects with

- yield 24.63 MPa for Tras originate from Village Tuwell .
3. Research results at the age of 28 days in all variation obtained mark strong press concrete highest with percentage of 75% on Tras 3 Test Objects with yield 28.63 MPa for Tras originate from Village Pringamba .
 4. Concrete with tras as replacement part aggregate fine with plan mark strong press concrete 30 MPa yet achieve the planned target .
 5. From the results testing strong press concrete mark was highest obtained from all variation Concrete Tras on preset Tras 75 % with mark strong press of 28.63 MPa.

SUGGESTION

Provided suggestions and input to the next researchers and civil practitioners as follows:

1. Tras wore For substitution Partial sand, then recommended For use similar gradation sand so the binding with similar cement binding sand with cement for making mixture concrete.
2. Tras variations are suggested For reducing cement water factor value, because For variation on 100% tras, in mixture finished concrete _ So For slump values do not enter, that is concrete too thick.
3. For results strong press concrete is Not yet by plan 30 MPa, so concrete Can be used in proportion concrete medium, not yet entered into the concrete quality high.

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