

APPENDIX

In the research to be done, the steps that must be prepared and also until the research is completed are as follows :

Concrete Mixing Stage

1. The collection of gravel and sand materials is carried out at the batching plant of PT. Restu Anak Jaya Abadi Beton Indonesia, located in Oso wilangon, West Surabaya.



2. The process of weighing the material to be carried out in the form of gravel, sand, and cement according to the mix design plan. Before weighing the sand, the sand was sieved through a 4.75 mm sieve and for cement it was sieved through a 2.36 mm sieve.



3. Weighing Silica Fume according to the calculation mix design that has been done.



4. The process of weighing water and superplasticizer according to the calculation of the mix design. The planned water-cement ratio to be used is 0.3 in accordance with the f'_c plan. For superplasticizer is used in the casting process to be carried out using a percentage of 0.4% by weight of cement.



5. After everything has been weighed, put all the ingredients that have been prepared and put into the mixer. Make sure the mixer is clean and not too wet. the first is to enter the fine aggregate material (sand), then enter the coarse aggregate material (gravel), then add cement into it. And lastly, add silica fume as an added ingredient to the concrete mix.



6. After the material is put into the mixer, turn on the mixer so that the mixer can move. After a few minutes add water and pour it into the mixture in the mixer, then after some time, put the superplasticizer into the mixture and add more water until the concrete mixture looks all mixed. The time required for the concrete mixture to mix all ± 20 minutes.



Slump Test and Molding of The Concrete Mixture Into Cylinders

1. When you have done the casting stage, the next step is to do the slump test. The slump test is carried out to determine the characteristics of the concrete that has been cast. First, prepare the tools to do the slump. second, put the mixture into the cone for the slump test of 1/3 parts first, then tamped 25 times, then put the concrete mixture again into the Abrams cone 2/3 parts and tamped up to 25 times, then add the concrete mix again to 3/3 parts and tamped 25 more times. Third, lift the cone slowly until you see the shape of the crushed concrete mixture. And lastly, measure the length of the slump obtained after being lifted from the cone.



2. The next stage is that the concrete mixture is inserted into each of the cylinders that have been provided, then after entering 1/3 part, knead the mixture so that the concrete can be evenly distributed to the surface, also do 2/3 parts, and finally 3/3 parts. Then fill again until it fills the surface of the cylinder. Don't forget to leveling the surface of the concrete with a trowel so that the surface can be flat and neat.



Wet Volume Weight and Dry Volume Weight Test

1. When the concrete has been put into the cylinder, give the name to the concrete. it also makes it easier for researchers to find out the concrete to be tested with concrete aged 7 days, 14 days and also 28 days.



2. After that, weigh the wet volume weight where the wet weight is the weight of the cylinder plus the weight of the concrete in the cylinder. After weighing the wet volume, then 1 day after weighing the wet volume weight, the concrete is removed from the mold and will be curing.



3. After being removed from the mold, the concrete is put into the curing pond so that the concrete does not lose water quickly and also to maintain the temperature of the concrete to be cured. Curing was carried out for 6 days, 13 days, and 27 days a day before the compressive strength test was carried out.



4. After lifting the curing pool, 1 day after the concrete is removed from the curing pool, the dry volume weight will be weighed in order to determine the difference between the concrete before it is immersed in the curing pool and after being removed from the curing.



Compressive Strength of Concrete Test

1. The first stage to do before testing the compressive strength is to give a capping on the concrete surface, this aims to flatten the surface of the test object so that during the testing process the compressive strength can be distributed evenly over the entire surface of the concrete so that the results obtained will be more stable and better..



2. The next step is to test the compressive strength of concrete for 7 days, 14 days and 28 days in order to determine the strength value of the concrete that is given a load. With this concrete compressive strength test, you can also find out whether the designed concrete can meet the design compressive strength or not.



Water Absorption of Concrete Test

1. In the water absorption test, using a tube measuring 10 x 20 cm smaller than the compressive strength test of concrete. Water absorption testing is carried out after the concrete is removed from the curing pond. The first step is to weigh the wet weight of the resulting concrete.



2. After weighing the wet weight of the concrete, the concrete is put into the oven at a predetermined temperature for ± 24 hours. After being baked, the concrete is removed from the oven and weighed to determine the dry weight of the concrete to determine the absorption results obtained.



Comparison of In-Campus Labs and Off-Campus Labs

During the research process, 2 material tests were carried out in different places, including testing coarse and fine aggregates with scales outside the campus and on campus, fine aggregate testing using scales outside the campus is sieve analysis, sand moisture, specific gravity, water absorption, volume weight, bulking, mud in wet way, mud in dry way, while for coarse aggregate testing using off-campus scales is sieve analysis, gravel moisture, water absorption, volume weight, mud in dry way, then fine aggregate testing using scales on campus is sieve analysis, sand moisture, specific gravity, water absorption, volume weight, bulking, mud in wet way, mud in dry way and for coarse aggregate testing using on-campus scales is sieve analysis, gravel moisture, water absorption, volume weight, mud in dry way, abrasion. From the results of research conducted on campus and off campus, the results of the scales obtained are not much different, but when carrying out the mixing process, it is recommended to use scales outside the campus because the scales used are digital scales so that when weighing the material the results obtained are more accurate and efficient and can shorten the time of this because the scales on campus have a maximum limit of only 20kg while outside the campus can exceed it so that easier when weighing large quantities of material.

On campus laboratory tests, the tests for fine aggregate and coarse aggregate materials are not much different from off campus tests. Then when mixing is carried out on campus, the slump value at 0% percentage is 16 cm, while for mixing carried out outside the campus, the slump value is at 0% percentage of 15 cm. However, the compressive strength test resulted in a different compressive strength value from the tests carried out outside. for on-campus testing the average value is 52.4 MPa while for off-campus compressive strength testing the average value is 41.5 MPa. This is because it can be from the material storage factor before the casting process is carried

out and the gravel used still contains a lot of mud. However, the compressive strength of concrete still meets the standards of high quality concrete with a value above 41.4 MPa.

Fine aggregate material testing

Testing	On Campus	Off Campus
Fine Modulus	2.79	2.80
Sand Moisture	4.78%	2.87%
Specific Gravity	2.56	2.68
Water Absorption	1.57%	1.58%
Volume Weight	1.39 gr/cm ³	1.53 gr/cm ³
Bulking	28%	20.64%
Mud in Wet Way	4.68%	4.87%
Mud in Dry Way	4.7%	3.35%

Coarse aggregate material testing

Testing	On Campus	Off Campus
Fine Modulus	7.18	7.31
Gravel Moisture	0.16%	1.1%
Specific Gravity	2.62	2.76
Water Absorption	1.85%	1.80%
Volume Weight	1.38 gr/cm ³	1.51 gr/cm ³
Abrasion	26.66%	-
Mud in Dry Way	0.57%	0.44%

Concrete testing

Testing	On Campus	Off Campus
Slump Test Value	16 cm	15 cm
Compressive Strength of Concrete at 28 Day	41.5 MPa	52.4 MPa

On-campus testing



Off campus testing

