Manufacture of Specimens for Experiment the Main through Testing Pre Conditions

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Abstract— *In general, this study emphasizes the importance of reliability and validity, including quantitative research (focus his gaze on post positivism). Reliability of a study is determined by the accuracy of material selection, to obtain regularity in the manufacture of test specimens that produce research that is not biased (either on empirical studies, manuals, analytical and divaliditasi with the program), which of course is a methodological side. While on the theoretical side of course expected developments in the theory. Even desired new things in theory and methodology.*

Keywords— reliability, regularity manufacture of test specimens.

I. INTRODUCTION

Referring to one of the previous research, the study Patmadjaja H, et al, 2001, regarding the use of preliminary research specimen concrete cube in flexible pavement types of cement treated base (CTB). This study is a preliminary study in the laboratory to find the relationship between the strength compressive test specimen cube (15 x 15 x 15) cm3 and test object cylinder with a diameter of 7.1 cm, height 14.2 cm. A factor of 0.65 according the research is the value of equivalence between the compressive strength of cubes with UCS cylinder [1]. The results obtained in accordance with the principles, calculations and special treatment in accordance the relevant literature, so it can be used as a reference.

II. INSPIRATION

The results of the study Patmadjaja H, et al, 2001, became a inspiration source of regularity manufacture testing preconditions of specimen (series of testing done to confirm that the ingredients / materials to be used in the main testing already meet the standards konvensinal / traditional) to the main testing (test which is based on the importance of independent variables, the dependent variable and control variables), which has been approved by experts, researchers, academics and practitioners that it's okay there are certain values of one test against other tests such as those already obtained from previous studie [2]. Focused to the principles, calculation and certain treatments for obtained the multiplier factor the relationship between the compressive strength cube vs strength cylinder / unconfined compressive strength (UCS) as shown is table 1 below.

Table 1. Cube compressive strength vs cylinder compressive strength (UCS)

Cement content (%)	Water content (%)	cube compressive strength (%)	cylinder compressive strength (UCS)	multiplier factor
3	5,8	47	27,5	0,59
4	6,3	69	43	0,62
5	4,6	66	64	0,74
Average multiplication factor of				0,65

Source: The results Patmadjaja H, et al, 2001

The results in Table 1 that gives the sense that the rule for this field (especially in Indonesia) that uses a test cube specimen for ease in control, still can be done, because the principles, calculation and certain treatments obtained coefficient multiplier factor if it refers to the standardized testing generally accepted (international) which refers to the American Association of State Highway and Transportation Official (AASHTO) 1986 [3] on testing (UCS) the concrete cylinder with diameter 7.1 cm and 14.2 cm high.

III. INNOVATION

Following the steps of previous studies in this paper then raised the idea to make the test object at the main testing through preconditions testing based on the principles, calculations and typical treatment in order to obtain reliability (validity of the results did not deviate if applied to subsequent test). Pre-testing is a conventional testing conditions that depend on the need of the main testing. While testing the primary / fundamental is the testing effort to get the novelty of a study based on searches earlier testing, or in other words an effort to discover the novelty of the previous studies (both on the theory and

methodology) as a real basis for a decision, as results of analysis and evaluation thoroughly and deeply (following the principle of deterministic philosophy).[3]

Innovation in this paper tried to show a correlation between regularity of testing a pre-condition to the main testing, on side of the compaction energy calculations to get the number of beats hammer on making major test object, wherein the test object will be used in testing the pavement structure multilayered with a static load (either at the center, edge and corner) specimen, but can also be developed with other loading models, for example, cyclic load or dynamic load. Modelling of loading adjusted need.

Testing precondition for testing layered pavement structure include: Marshall test, cantabro, permeability, UCS, ITS. It is known that the manufacture of specimens for all kinds of testing using Marshall pattern (with a hammer pattern Marshall). Focused on this view, and the attempt to modify the previous studies it can be argued that one important aspect in the manufacture of test specimens Marshall hammer is the sum of the fall of the hammer, where the determination of the amount of the fall of the hammer with the estimation of compaction effort (compaction energy). Compaction effort was first developed 1920s by R.R. Proctor. [4]

The formula according to AASHTO compaction energy. 1986, the following:[5]

E = (N.W.S) / V .... (1)

Where:

E = Energy (ft lb / cu ft)

N = Number sum of fall hammer

V = Volume (cu ft)

W = Weight hammer (lb)

S = Height of fall hammer (ft)

Other formulas compaction energy per unit volume (E), expressed in the equation

$$E = \frac{N\,b\,N\,i\,W\,H}{V} \quad \text{..... (2)}$$

by:

N b = Number of blows/layer

N I = Number of layers

W = Weight hammer

H = Height of fall hammer

V = Volume of mold

There is also a formula,

$$E = \frac{\text{Number of blows layer x Number of blows layer x Weight hammer x Height of fall hammer}}{\text{Volume of mold}} \quad \text{...(3)}$$

Formula 1,2 and 3 on th**e** same principle, which is used in this paper is the formula 1 and are commonly used in road planning, the formula is wearing proctor standard and modified , as has been calculated by previous researchers (Harry Patmadjaja). The results of the calculation are shown in Table 2 and the tools used according to the image 1, which in this case modified into a Hammer Marshall the standard, Hammer Marshall modifications are not counted in this paper (which is done is to modify the hammer of the standard Marshall)

The results of compaction energy calculation of Hammer Marshall the standards can be seen in Table 3 below:

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Fig.1: Tools Proctor compactors

Table.2: Proctor Compaction Energy Calculation

	Standar Proctor	**Modified Proctor**
Number sum of fall hammer	3 x 56	5 x 56
Hammer weight	5,5 lb	10 lb
High Fall	1 ft	1,5 ft
Mold Diameter	6 in	6 in
Mold High	4,584 in	4,584 in
Mold volume	0,075 cu ft	0,075 cu ft
Energy Compaction	12320 ft lb/cu ft	56000 ft lb/cu ft

Source: The results Patmadjaja H, et al, 2001

Table.3: Marshall Hammer Standard

MARSHALL HAMMER STANDARD	
Number sum of fall hammer	2 x 50
Hammer weight	10 lb
High Fall	1,5 ft
Mold Diameter	4 in
Mold High	3 in
Mold volume	0,021 cu ft
Energy compaction of	71381 ft

Source: Results of the modified data processing

Table.4: Results of calculation of the Number sum of fall hammer

Type compacting plate	Plate (100 x 100 x 10) cm^3			
	Volume (cu ft)	Weight (lb)	Height of fall (ft)	Number sum of fall hammer
Standard	0,22	10	1,5	1 x 1046

Source: Results of the modified data processing

Table.5: The results of calculation of the Number sum of fall hammer

Type compacting plate	Plate (100 x 100 x 10) cm^3			
	Volume (cu ft)	Weight (lb)	Height of fall (ft)	Number sum of fall hammer
Modification 1	0,22	22	1,5	1 x 476

Source: Results of the modified data processing

Corresponding calculation results in Table 3 above, then be calculated the number sum of fall hammer on the main test specimen, taken as an example of the application / use of the test object in the form of plate-sized (100 x 100 x 10) cm3. Calculation results can be seen in Table 4 above. To facilitate the work of making the test specimen plate, should be high-fall hammer fixed and heavy the hammer modified (eg hammer made of concrete cast by the handle or a handle steel plate), meaning in this paper discuss manual compactor. For example, application / usage plan of the hammer weight 22 lb, the fall of the hammer height of 1.5 ft. Calculation results can be seen in Table 5 above: According to Table 5 above the sum of fall hammer in the lining plate one layer, as many as 476 times, it means 476 the sum of fall hammer on the surface area of the test specimen plate-shaped measuring 100 cm x 100 cm, further modifications to the determination of the shape and size of the hammer, (shaped squares size 25 cm x 25 cm / obtained 16 grid) or the size of 12.5 cm x 12.5 cm / obtained 64 grid). Up here can set pergrid 7 times or 30 times depending on the size of the hammer used.

IV. CONCLUSION

Based on step the calculation energy compaction hammer Marshall standard (a cylindrical shape in the form of a plate) and (shape and size of the hammer) obtained the fall of the hammer for one layer is equal to 476 times, which pergridnya adjust to the hammer used.

V. RECOMENDATION

The result of the calculation of the sum of fall hammer for one layer is equal to 476 times can be used in the manufacture of test specimens main testing, if associated with test results using cylinder then obtained a multiplying factor (the relationship between the compressive strength of cylinders vs. plate), should also be done calculation hammer Marshall the modifications to get comparison between Marshall the standards and Marshall the modifications

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