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SURFACE FLOW REDUCTION AT APUDDLE AREA BY POROUS RECHARGE

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Abstract

Waterlogging occurs when rain is rain water that gathered accumulation exceeded the rainage capacity of the river and it is causedndue to the absence of absorption infiltration into the soil this the study aimed to assess the basic characteristics of the land area of inundation, (material volcanic rocks, and chunk) and infiltration capacity this research method is the study of soil mechanics laboratory experiments using soil samples from 2 nundation areas, areas not graceful and the samples of porous material and chunks of mountain rock (sand, cement, bricks) the result showed that the characteristics of waterlogged soil including silt soils kelempungan category and has a value of permeability 0.0002099 cm/sec, permeability volcanic rocks 0.04505 cm/s, permeability blocks (sand, cement, bricks) 0.02955 cm/sec. This suggests that the volcanic rocks have large permeability values that can be just passed substantial drainage. From the analysis carried out shows the reduction of surface water to echarge the mountain rock so big that can reduce surface runoff and can also recharge ground waterreserves.

Keywords: absorption, Material,areas,water,volcanic.

INTRODUCTION

Water is a necessity which is very important for the human race and the universe, but also vice versa can be disastrous when the excessive water. Excess water makes soil saturated, so that the resulting standing water (River, Lake, empang, etc.) (Triatmojo, 2008).

The Hydrologic cycle of water, rain down to Earth most going into the belly of the Earth, and part will be the stream surface. Because of the condition of the catchment is getting narrow, then the chance for rain water infiltration becoming increasingly diminished, making the water overflow became a flood. Floods are part of the hydrological cycle, i.e. in the water on the surface of the Earth that is moving to the Sea (Yamin, 2010). While the use of ground water for the needs of the community especially in urban areas has increased through the system pompanisasi, resulted in a deficit of groundwater in existing it advance groundwater.Changes in land use by developers in urban areas have increased, resulting in a reduced area of more permeated rain water Increase area covered permeated residential buildings, offices, the roughness of the concrete cause water gathering time is much shorter.

Based on the above issues, it is necessary in the do konserfasi rain water throughthe drainage system,an environment that is by the shape of the well permeated. With the so wellin in then overflow the water surface can be reduced and the reduction of the potential for flooding (Jimbo 1999) The weight of the material type in in defenition as a measure of mass per unit volume. The greater the mass of an object type, then the greater the mass per unit volume anyway. An examination of gravity aims to determine the weight of the bulk, weight, typeof surfacesaturated type (saturated surface dry = SSD), artificial gravity (apparent), and water absorption of coarse aggregate.

Porosity is the comparison between total pore volume with the total volume of the sample. Pore volume can be in the know with the method of sa Analysis of rainfall of 3 station rainfall in the Makassar region by using the rational method, then obtained the intensity of precipitation on average per year: 351.892 mm/hour. Modification of rain shower approaching results obtained simulator I plan, i.e., I1 = 250.125 mm/h, I2 = 305.427 mm/h, I3 = 351.892 mm/h, so that modifications to the Simulator valid rain shower to use for research.

The above data is pulled the relationship between the variation of height (h) of the intensity of the rainfall, it is the relationship with the height variation of precipitation intensity, suggesting a correlation of rainfall intensity, intensity of rainfall of 351.892 mm/h was converted to 5 cm.Testing conducted at laboratory soil mechanics experiment method with Hasanuddin University, Civil permeated porous using simulated rain shower modifications to the simulator.Research is conducted each 1 time each sample and then the data obtained in the analysis and in numerical validation by vados.

THE TEST RESULTS

Characteristics of porous material samples

Table 1 shows the value of the coefficient (k) Permiabilitas porous material in laboratory test results show that the permeability of the soil in the area of inundation and The area not inundated not too much different where the permeability of the soil on the area between the pools of 0.0002099 – 0.0002856 cm /Sec, average 0.0002477 cm/sec.

Porous material mass, has a coefficient of permeability of 0.02955 cm/dt, is smaller thana mountain rock material that is permeable of 0.04504 cm/sec. Stone Mountain has hig permeability value of 0.04504 cm/sec, which suggests that the rocks are very low porosity, so the time needed to accommodate water coming out sooner.Permeated and runoff

Table 2 shows the calculation of the rate of permeating material testing ground with layers of soil thickness 15 cm on sample 1 occurred at 10 minutes, with the rate of permeated of 0.0256 mm/min constant permeated happens at the time of 55 minutes that means the ground is already saturated against permeated. In sample 2 permeated recently took place on the 10th of 0.0304 mm/min and the constant in the second 50, the material has no difference in meaning. This indicates that the value soil permeability materials that are small will allow the occurrence of inundation and runoff are great and more quickly in the event of rain.The rate of permit in porous material greater than the rate of soil material permeated in sample 1 and sample 2. The existence of a porous material as a substitute for soil layers resulting in permeated rate greater than the rate of overall soil with a layer of permeated. This occurs because the porous material has a larger grain size of soil grain size so that the coefficient of permeability of porous material greater than the coefficient of permeability land. Figure 1. Graph showing the rate of permeated on soil samples 1, 2 and porous material shows that the rate of porous material permeated is greater than the rate of permeated soil samples 1 and 2. Porous materials have a high permeability value of 0.04504 cm/s.

This indicates that the porosity of porous materials is very low, so that the time needed to accommodate water coming out fasterTable 3 shows the calculation of the rate of runoff of materials testing ground with the soil layer thickness 15 cm shows the time used a new runoff occurs at a rate of 15 minutes to the runoff amounted to 2.496 mm/min and the constant runoff in 55 minutes. In sample 2, showing time going on runoff in the 10th, with the rate of runoff of 3.044 mm/minute. This means that the inundation occurs at the 50th minute. Currently the rate of runoff porous material ranging from 15 minutes to 45 minutes and so on in the 50th minute with constant value already 4.016 mm/min,and it shows that the rate of runoff porous material smaller than the rate of runoff due to the soil material permeated material is porous. Figure 2 shows, the rate of runoff porousmaterial is smaller than the two material samples of soil and it showed that the porous material such as Stone Mountain a lot percolating water than soil material the soil material.

DISCUSSION

The results of this research to see that the value of permeability of porous material (k) Stone Mountain is much greater than the value of the permeability of the soil material. The value of permeability porous material is much bigger than a large, influential soil material against the effectiveness permeated Djatmiko, et al. (2001). The effectiveness of porous material is higher permeated of permeated soil material effectiveness looks at the numbers a greater permeability coefficient.

Modeling for the material in the form of stone mountain made against intenseLaboratory test results are compared with the results of the simulation of vadose/w produce distribution points based exactly on the lines of the standard linear, so it still shows an increase in linear. So from the graph shows that the level of modelling between test results and laboratory test results indicating the numerical simulation modeling representative.

Numerical Analysis Of Vadose (Tiatmojo. DKK. (2002), against permeated flow velocities obtained the following results: the rate of permeated soil Vadose analysis according to:0.0400 mm/meit, while according to laboratory test: 0.02904 mm/min, so the difference: 0.01096 mm/min is very small. Stone Mountain permeated rate, according to analysis Vadose: 0.1734 mm/min, whereas, the results of the laboratory test: 0.1875 mm/min, so the difference: 0.0141 mm/min is very small. The rate of permeated chunks according to an analysis of Vados: 0.1344 mm/min, whereas the results of the Laboratory: huge 0.1394 mm/min so the difference: 0.005 mm/min is very small.The results of the analysis of the numeric permeated Vadose speed compared with test results rate permeated rain shower simulator Laboratory happened a very small difference, it means proving that test permeated porous rainfall simulator is correct.

CONCLUSION

Based on the results of testing in a laboratory experimental study of porous material against in the area of inundation, the following conclusions can be drawn: material characteristics of soil test results and return the value of Permeabilitasnya is lower than with a porous material that is permeability coefficient k ground 0.0002099 cm/Sec, are porous materials k 0.04505 cm/sec, and it was very influential towards the power permeated.The calculation of the reduction of surface runoff is generated as follows:The location of the ground water reduction capable flashlight Resing runoff/puddle of 26.29%. Being on the ground located AP Pettarani III, capable of meredusi surface water/puddle of 38.64%,Stone Mountain is a porous material can be a layer permeated permeated water, as it can reduce runoff/flooding and inundation.

This research was limited to a few materials, therefore it is recommended to perform advanced research: the need for advanced research, test models of the well permeated with stone mountain and a mass of material for analyzing the flow velocity in well permeated. The need for further research on the placement of the Stone Mountain fill the base of the lake water as unhas permeated and filling groundwater reserves.

Laboratory test results are compared with the results of the simulation of vadose /w produce distribution points based exactly on the lines of the standard linear, so it still shows an increase in linear. So from the graph shows that the level of modelling between test results and laboratory test results indicating the numerical simulation modeling representative.Numerical Analysis Of Vadose (Tiatmojo. DKK. (2002), against permeated flow velocities obtained the following results: the rate of permeated soil Vadose analysis according to:0.0400 mm/met, while according to laboratory test: 0.02904 mm/min, so the difference: 0.01096 mm/min is very small. Stone Mountain permeated rate, according to analysis Vadose: 0.1734 mm/min, whereas, the results of the laboratory test: 0.1875 mm/min, so the difference: 0.0141 mm/min is very small. The rate of permeated chunks according to an analysis of Vados:

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Tabel1. Rekap Hasil Pengujian Permeabilitas MaterialBerpori/ Table 1. Recap Of Material Permeability Porous Test Results

Type	The length of the	YangDi		(menit)	Average
Sampel	Sampel	Ukur			
	(cm)	(ml)	I	II	
Stone Mountain	10	500	0,0454	0,0447	0.04504
chunk	10	500	0,0299	0,02955	0.02955
Land	10	500	0,000209	0,000285	0,0002477

Volume Of Water

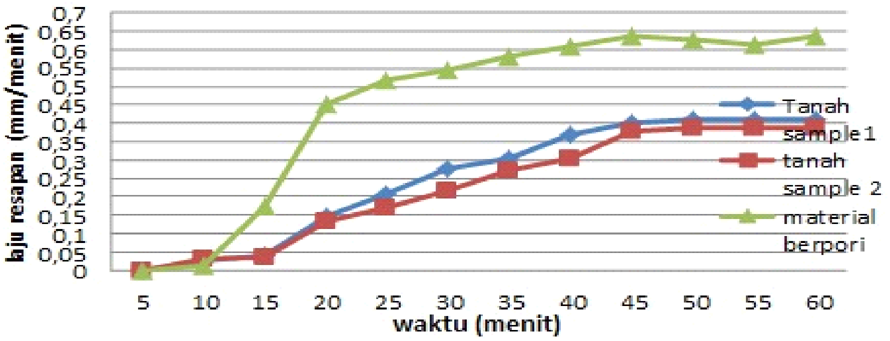
KoefisienPermeabilitas

Table 2. Recap rate calculation results recap on testing

timeSampel1(Racing) Sampel2(PettaraniIII) M berpori

menit	resapan ml	lajuresapan mm/menit	resapan ml	lajuresapan mm/menit	resapan ml	lajuresapan mm/menit
5	0	0	0	0	0	0
10	80	0,0256	95	0,0304	42	0,01344

15	25	0,04	110	0,0352	541	0,1875
20	455	0,145	420	0,134	1414	0,4524
25	650	0,208	525	0,168	1620	0,5184
30	855	0,274	675	0,216	1700	0,5444
35	952	0,305	845	0,27	1810	0,5792
40	150	0,368	955	0,305	1906	0,6099
45	255	0,402	1175	0,376	1945	0,6361
50	270	0,41	1205	0,386	1960	0,6272
55	285	0,411	1205	0,386	1985	0,6352
60	285	0,411	1205	0,386	1985	0,6352



Gambar1. Grafik Lajuresapan/ Figure 1. The graph of the rate of resapan

Tabel3.Recap the results of calculation the rate of runoff

time

Sampel 1 Sampel 2 Porous materials

ml	limpas mm/mnt	Ml	limpasan mm/menit	ml	limpasan mm/menit
0	0	0	0	0	0
0	0	0	0	120	0,0384
780	0,2496	950	0,3044	550	0,176
1025	0,3280	1250	0,400	720	0,234
1250	0,4000	1340	0,4301	955	0,3056
1330	0,4256	1550	0,4450	1180	0,3776
1460	0,4672	1650	0,5146	1195	0,3824

1490	0,4768	1740	0,5250	1220	0,3904
1525	0,4888	1850	0,5350	1235	0,3952
1560	0,4992	1930	0,5568	1255	0,4016
1585	0,5072	1930	0,5568	1255	0,4016
1585	0,5072	1930	0,5568	1255	0,4016

limpas

Laju/The rate of
limpas
Laju/passing
limpasan
Laju/The rate of

menit
5
10
15
20
25
30
35
40
45
50
55
60

lajulimpasan(mm/menit)/ runoff rate (mm/min)

7

6

5

4

3

2

1

0

5 10 15 20 25 30 35 40 45 50 55 60

time (minutes)

sampletanah 1 sampeltanah 2 materialberpori / Sample 1 sample 2 soil porous material

Gambar2. Grafik laju limpasanFigure 2. The graph of the rate of runoff