LAMPIRAN

FAKULTAS TEKNIK SIPIL DAN PERENCANAAN
JL KALIURANG KM.14,4 TELP.895042
EMAIL : FTSP UII.AC.ID JOGJAKARTA KODE POS 55584

FM-UII-AA-FPU-09

UNTUK MAHASISWA

KARTU PESERTA TUGAS AKHIR

NO	N A M A	NO.MHS.	BID.STUDI
1.	ILHAM ARDIANSYAH	01511187	Teknik Sipil
2.	AKHMAD MUNIP	01511227	Teknik Sipil

JUDUL TUGAS AKHIR

Kuat tekan Beton Terkekang Dengan Pengekang Wire Mesh

PERIODE KE : I (Sep 05 - Peb 06)
TAHUN : 2005 - 2006
Sampai akhir Pebruari 2006

No.	Kegiatan	Bulan Ke :					
		SEP	OKT.	NOP.	DES.	JAN.	PEB.
1	Pendaftaran						
2	Penentuan Dosen Pembimbing						
3	Pembuatan Proposal						
4	Seminar Proposal						
5	Konsultasi Penyusunan TA.						
6	Sidang - Sidang						
7	Pendadaran						

Dosen Pembimbing I : Ade Ilham ,Dr,Ir,MT

Dosen Pembimbing II : Ade Ilham ,Dr,Ir,MT

Jogjakarta , 7-Sep-05
a.n. Dekan

Ir.H.Munadhir, MS

Catatan :
Seminar : _____
Sidang : _____
Pendadaran : _____

CATATAN KONSULTASI TUGAS AKHIR

NO	TANGGAL	CATATAN KONSULTASI	TANDA TANGAN
1.	22-9-05	- [illegible] data yang [illegible] pd pendahuluan [illegible] [illegible] informasi [illegible] yg [illegible] [illegible] - [illegible] [illegible] - [illegible] [illegible] [illegible]	
2.	24-9-05	- Lengkapi landasan teori - bahan² berkaitan yg perlu di [illegible] [illegible] [illegible] [illegible] [illegible] - lengkapi dg teori beton [illegible]	
3.	13-10-05	- perbaiki hasil koreksi - [illegible] penulisan daf pustaka	
4.	14-10-05	- Dpt mempersiapkan bahan² utk menguji agr yg diperlukan utk hitungan komposisi campuran. - Menghitung komposisi campuran - Dpt mempersiapkan seminar proposal	
5.	25-02-06	- Perbaiki hsl koreksi - perbaiki pembahasan → alasan²nya dari hasil yg lebih rendah dsb. - lengkapi yg sesuai yg diminta	
6	9-03-06	- Cari literatur hasil penelitian [illegible] kapur f-ε bersengkang & dan CFT - Siapkan semua draft TA harus lengkap	
7.	28-03-06	- Penulisan rumus² yg berindeks, buatlah dlm bentuk indeks Lengkapi mulai cover s/d lampiran Perbaiki hasil koreksi - Siapkan utk sidang	

LAMPIRAN 1

(Data Pemeriksaan Agregat)

LABORATORIUM BAHAN KONSTRUKSI TEKNIK
FAKULTAS TEKNIK SIPIL DAN PERENCANAAN
UNIVERSITAS ISLAM INDONESIA
Jln. Kaliurang Km. 14,4 Tlp. (0274) 895707, 895042 fax : (0274) 895330 Yogyakarta 55584

HASIL PEMERIKSAAN BERAT JENIS DAN KADAR AIR PASIR

No. / Ka.Ops. / LBKT / / 2005

Penguji : Ilham Ardiansyah Ditest tanggal : 21 November 2005
Akhmad Munip

Pasir asal : Kaliurang

Keperluan : Tugas Akhir

URAIAN	Contoh 1	Contoh 2	Rata-rata
Berat Pasir Kering Mutlak, gram (Bk)	488	471	479,5
Berat Pasir Kondisi Jenuh Kering Muka, gram	500	500	500
Berat Piknometer Berisi Pasir dan Air, gram (Bt)	976	970	973
Berat Piknometer Berisi Air, gram (B)	658	665	661,5
Berat Jenis Curah, gram/cm^3 ..... (1) Bk / (B + 500 - Bt)	2,68	2,42	2,55
Berat Jenis Jenuh Kering Muka, gram/cm^3 ..... (2) 500 / (B + 500 - Bt)	2,75	2,56	2,655
Berat Jenis Semu..... (3) Bk / (B + Bk - Bt)	2,87	2,84	2,855
Penyerapan Air..... (4) (500 - Bk) / Bk x 100%	2,46	6,16	4,31

Keterangan :

500 = Berat benda uji dalam keadaan kering permukaan jenuh, dalam gram

Kesimpulan : berat jenis jenuh kering muka pasir tersebut = 2,655

Yogyakarta, Februari 2006

Disyahkan

LABORATORIUM
BAHAN KONSTRUKSI TEKNIK
FAKULTAS TEKNIK UII

Dikerjakan oleh

LABORATORIUM BAHAN KONSTRUKSI TEKNIK
FAKULTAS TEKNIK SIPIL DAN PERENCANAAN
UNIVERSITAS ISLAM INDONESIA
Jln. Kaliurang Km. 14,4 Tlp. (0274) 895707, 895042 fax : (0274) 895330 Yogyakarta 55584

HASIL PEMERIKSAAN BERAT JENIS DAN KADAR AIR KRICAK/KERIKIL

No. / Ka.Ops. / LBKT / / 2005

Penguji : Ilham Ardiansyah — Ditest tanggal : 22 November 2005
Akhmad Munip

Agregat asal : Clereng, Kulonprogo

Keperluan : Tugas Akhir

URAIAN	Contoh 1	Contoh 2	Rata-rata
Berat Kerikil Kering Mutlak, gram (Bk)	4917	4844	4880,5
Berat Kerikil Kondisi Jenuh Kering Muka, gram (Bj)	5000	5000	5000
Berat Kerikil Dalam Air, gram (Ba)	3134	3077	3105,5
Berat Jenis Curah,.....(1) Bk / (Bj - Ba)	2,64	2,52	2,58
Berat Jenis jenuh Kering Muka,..... (2) Bj / (Bj - Ba)	2,68	2,6	2,64
Berat Jenis Semu,..... (3) Bk / (Bk - Ba)	2,76	2,74	2,75
Penyerapan Air,..... (4) (Bj - Bk) / Bk x 100%	1,69	3,22	2,455

Kesimpulan : berat jenis jenuh kering muka agregat tersebut = 2,64

Yogyakarta, Februari 2006

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HASIL PEMERIKSAAN BERAT VOLUME AGREGAT KASAR

No. / Ka.Ops. / LBKT / / 2005

Penguji : Ilham Ardiansyah — Ditest tanggal : 23 November 2005
Akhmad Munip

Agregat asal : Clereng, Kulonprogo

Keperluan : Tugas Akhir

	Contoh 1	Contoh 2	Rata-rata
Berat Tabung (W_1), gram	6330	12197	9263,5
Berat Tabung + Agregat Kering Tungku (W_2), gram	13860	19573	16716,5
Berat Agregat Bersih (W_3), gram	7530	7376	8450
Volume Tabung (V), cm^3	5301,44	5301,44	5301,44
Berat Isi Padat (W_3 / V), $gram/cm^3$	1,42	1,39	1,405

Yogyakarta, Februari 2006

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FAKULTAS TEKNIK SIPIL DAN PERENCANAAN
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Jln. Kaliurang Km. 14,4 Tlp. (0274) 895707, 895042 fax : (0274) 895330 Yogyakarta 55584

DATA MODULUS HALUS BUTIR (MHB) AGREGAT HALUS
No. / Ka.Ops. / LBKT / / 2005

Penguji : İlham Ardiansyah Ditest tanggal : 22 November 2005
Akhmad Munip
Pasir asal : Kaliurang
Keperluan : Tugas Akhir

Lubang Ayakan (mm)	Berat Tertinggal (gram)	Berat Tertinggal (%)	Berat Tertinggal Kumulatif (%)	Persen Lolos Kumulatif (%)
40.00	0	0	0	100
20.00	0	0	0	100
10.00	0	0	0	100
4.80	40	4	4	96
2.40	86	8,6	12,6	87,4
1.20	160	16	28,6	71,4
0.60	246	24,6	53,2	46,8
0.30	220	22	75,2	24,8
0.15	160	16	91,2	8,8
Sisa	88	8,8		
Jumlah	**1000**	**100**	**264,8**	

Modulus Halus Butir = $\frac{264,8}{100} = 2,65$

Yogyakarta, Februari 2006

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BAHAN KONSTRUKSI TEKNIK
FAKULTAS TEKNIK UII

Dikerjakan oleh

LABORATORIUM BAHAN KONSTRUKSI TEKNIK
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GRADASI PASIR

Lubang ayakan (mm)	Persen butir agregat yang lewat ayakan			
	Daerah I	Daerah II	Daerah III	Daerah IV
10	100	100	100	100
4,80	90-100	90-100	90-100	95-100
2,40	60-95	75-100	85-100	95-100
1,20	30-70	55-90	75-100	90-100
0,60	15-34	35-59	60-79	80-100
0,30	5-20	8-30	12-40	15-50
0,15	0-10	0-10	0-10	0-15

Keterangan : Daerah I : Pasir kasar
Daerah II : Pasir agak kasar
Daerah III : Pasir agak halus
Daerah IV : Pasir halus

Hasil analisa ayakan masuk daerah : 2 (dua)

Jenis pasir : agak kasar

Yogyakarta, Februari 2006

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FAKULTAS TEKNIK UII

Dikerjakan oleh

LAMPIRAN 2

(Data Hasil Pengujian Kuat Tarik *Wire Mesh* & Baja Tulangan)

HASIL PENGUJIAN KUAT TARIK *WIRE MESH*

Benda Uji	Gaya Tarik Tunggal (kg_f)	Gaya Tarik Ganda (kg_f)	Tegangan Putus (f_u)	
			Tunggal (MPa)	Ganda (MPa)
1	78.57	168.37	406.0577	435.0766
2	67.35	182.40	348.0716	471.3309
3	66.79	168.37	345.1775	435.0766
		rata-rata	366.4356	447.1614

HASIL PENGUJIAN KUAT TARIK BAJA TULANGAN

Benda Uji	1	2	3
Diameter (mm)	5.28	5.28	5.28
Luas (cm^2)	0.2188	0.2188	0.2188
Pmaks (kg)	1005	1200	1250
P Leleh (kg)	740	780	760
P Patah (kg)	780	770	760
Teg. Leleh (f_y) MPa	338.1382	356.4159	347.2771
rata-rata f_y (MPa)		**347.2771**	
Teg. Ultimit (f_u) MPa	459.2282	548.3322	571.1794
rata-rata f_u (MPa)		**526.2466**	
Teg. Putus (f_f) MPa	356.4159	351,8465	347.2771
rata-rata f_f (MPa)		**351.8465**	

LAMPIRAN 3

(Perhitungan *Mix Design*)

Perhitungan Rencana Adukan Beton Dengan Metode ACI

Data-data : ~ f'c = 25 MPa

~ Ukuran maksimal kerikil = 20 mm

~ MHB pasir = 2,65

~ Berat jenis pasir (SSD) = 2,66

~ Berat jenis kerikil (SSD) = 2,64

~ Berat volume kerikil (SSD) = 1, 405 gr/cm^3 = 1,405 t/m^3

~ Berat jenis semen = 3,15 t/m^3

Volume 1 benda uji = ¼ x 3,14 x D^2 x t = ¼ x 3,14 x 0,15^2 x 0,30 = 0,0053 m^3

Volume 100 benda uji = 100 x 0,0053 = 0,53 m^3

1) Menghitung kuat desak rata-rata :

volume pekerjaan total = 0,53 m^3 < 1000 m^3 → volume pekerjaan kecil

mutu pelaksanaan baik

berdasarkan Tabel 3.1, diperoleh nilai Sd = 60 kg/cm^2, maka

m = 1,64 x Sd

= 1,64 x 60 = 98,40 kg/cm^2

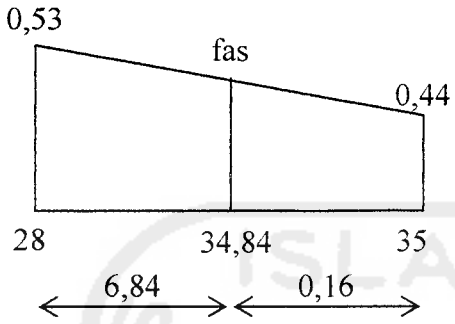
maka kuat desak rata-rata : f'cr = f'c + m

= 250 + 98,40

= 348,4 kg/cm^2 = 34,84 MPa

2) Menetapkan faktor air semen (fas)

berdasarkan Tabel 3.2, untuk f'cr = 34,84 MPa dengan interpolasi diperoleh



$$\text{fas} = \frac{6{,}84(0{,}44) + 0{,}16(0{,}53)}{6{,}84 + 0{,}16} = \frac{3{,}0944}{7} = 0{,}4421$$

dari Tabel 3.3 didapat fas = 0,60

* nilai fas dipakai = 0,4421

3) Nilai slump

dari Tabel 3.4 didapat slump = 7,5 – 15 cm

4) Jumlah air yang diperlukan per m^3 beton

berdasarkan nilai slump dan ukuran maksimal kerikil 20 mm, dilihat Tabel 3.6

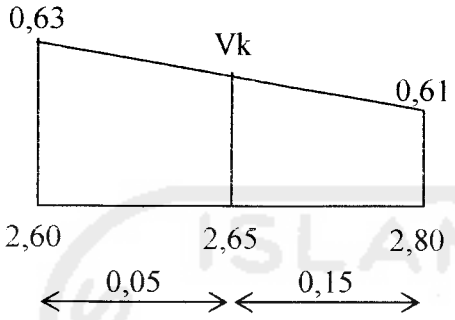
didapatkan : ~ jumlah air = 203 lt = 0,203 m^3

~ udara terperangkap = 2 %

5) Menghitung kebutuhan semen

berat semen per m^3 beton (Ws) = $\frac{A}{fas} = \frac{0{,}203}{0{,}4421} = 0{,}4592$ t = 459,2 kg

6) Menghitung volume kerikil dengan Tabel 3.7, berdasarkan ukuran butir maksimal 20 mm dan MHB pasir 2,65, dengan interpolasi didapat :



$$Vk = \frac{0{,}05(0{,}61) + 0{,}15(0{,}63)}{0{,}05 + 0{,}15} = \frac{0{,}125}{0{,}2} = 0{,}625$$

~ volume kerikil, Vk = 0,625 m^3

~ berat kerikil (Wk) = berat satuan kerikil x Vk

= 1,405 x 0,625 = 0,8781 t = 878,1 kg

7) volume absolut air, Va = 0,203 m^3

volume absolut semen, $Vs = \frac{Ws}{Bj} = \frac{0{,}4592}{3{,}15} = 0{,}1458\ m^3$

volume absolut kerikil, $Vk = \frac{Wk}{Bj} = \frac{0{,}8781}{2{,}64} = 0{,}3226\ m^3$

volume absolut udara, Vu = 0,02 m^3

volume absolut pasir, Vp = 1 – (Va + Vs + Vk + Vu)

= 1 – (0,203 + 0,1458 + 0,3226 + 0,02)

= 0,3086 m^3

~ berat pasir (Wp) = Vp x Bj = 0,3086 x 2,66

= 0,8209 t = 820,9 kg

8) Kebutuhan material dalam 1 m^3 beton

~ semen = 459,2 kg

~ pasir = 820,9 kg

~ kerikil = 878,1 kg

~ air = 203 lt

Kontrol terhadap berat jenis beton per m^3 beton :

Berat beton = Wa + Ws + Wp + Wk

= 0,203 + 0,4592 + 0,8209 + 0,8781

= 2,3612 t, (berat normal 2,3 ~ 2,4 t/m^3) → benar

9) Kebutuhan material benda uji

volume benda uji total = 0,53 m^3

perkiraan kehilangan material selama pembuatan benda uji 20 %, maka kebutuhan :

~ semen = 0,53 x 1,2 x 459,2 = 292,0512 kg

~ pasir = 0,53 x 1,2 x 820,9 = 522,0924 kg

~ kerikil = 0,53 x 1,2 x 878,1 = 558,4716 kg

~ air = 0,53 x 1,2 x 203 = 129,108 lt

10) Kebutuhan material dalam tiap cetakan silinder beton dengan perkiraan kehilangan material selama pembuatan sebesar 20 %

volume silinder = 0,0053 m^3

~ semen = 0,0053 x 1,2 x 459,2 = 2,9205 kg

~ pasir = 0,0053 x 1,2 x 820,9 = 5,2209 kg

~ kerikil = 0,0053 x 1,2 x 878,1 = 5,5847 kg

~ air = 0,0053 x 1,2 x 203 = 1,2911 lt

LAMPIRAN 4

(Hasil Pengujian Kuat Desak Beton Rata-rata)

KUAT DESAK BETON RATA-RATA UMUR 3 HARI

Sampel : Beton Tanpa Tulangan (BTT)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	304.6	150.6	12.711	17804.0826	250.1	2.3439	14.0473
2	301.5	150.0	12.695	17662.5000	224.2	2.3839	12.6936
3	302.7	150.3	12.560	17733.2207	223.0	2.3399	12.5753
4	302.8	150.0	12.558	17662.5000	265.9	2.3481	15.0545
5	303.0	151.9	12.572	18112.7839	279.3	2.2907	15.4200

Sampel : Beton Bertulang Sengkang (BBS)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	301.6	150.4	12.732	17756.8256	270.9	2.3774	15.2561
2	304.0	150.2	12.697	17709.6314	294.0	2.3584	16.6011
3	302.6	150.6	12.812	17804.0826	296.0	2.3781	16.6254
4	303.2	150.0	12.840	17662.5000	291.1	2.3976	16.4812
5	303.3	150.0	12.897	17662.5000	272.5	2.4075	15.4282

Sampel : Beton Bertulang *Wire Mesh* (BBWM)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	301.2	150.2	12.537	17709.6314	282.8	2.3503	15.9687
2	302.8	150.2	12.513	17709.6314	234.2	2.3334	13.2244
3	302.7	150.1	12.590	17686.0579	241.7	2.3517	13.6661
4	302.2	150.6	12.522	17804.0826	257.6	2.3273	14.4686
5	302.2	150.0	12.620	17662.5000	291.5	2.3644	16.5039

Sampel : Beton Bertulang Sengkang *Wire Mesh* (BBSWM)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	302.6	150.4	12.800	17756.8256	295.2	2.3822	16.6246
2	302.8	150.0	12.767	17662.5000	282.9	2.3872	16.0170
3	302.1	150.0	12.812	17662.5000	346.2	2.4011	19.6008
4	301.2	150.8	12.730	17851.4024	354.8	2.3676	19.8752
5	302.5	151.4	12.880	17993.7386	319.3	2.3663	17.7451

KUAT DESAK BETON RATA-RATA UMUR 7 HARI

Sampel : Beton Tanpa Tulangan (BTT)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	302.4	151.4	12.720	17993.7386	355.7	2.3377	19.7680
2	302.9	150.2	12.571	17709.6314	338.3	2.3435	19.1026
3	302.7	150.5	12.568	17780.4463	309.5	2.3351	17.4068
4	303.0	150.3	12.543	17733.2207	342.9	2.3344	19.3366
5	303.0	150.4	12.459	17756.8256	308.8	2.3157	17.3905

Sampel : Beton Bertulang Sengkang (BBS)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	301.7	150.0	12.945	17662.5000	361.9	2.4293	20.4897
2	303.2	150.3	12.793	17733.2207	334.7	2.3793	18.8742
3	301.8	150.0	12.840	17662.5000	367.9	2.4088	20.8294
4	303.5	150.3	12.893	17733.2207	344.5	2.3956	19.4268
5	302.7	150.0	12.770	17662.5000	339.1	2.3885	19.1989

Sampel : Beton Bertulang *Wire Mesh* (BBWM)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	302.3	150.0	12.640	17662.5000	329.5	2.3673	18.6553
2	302.3	150.6	12.765	17804.0826	323.4	2.3717	18.1644
3	302.7	150.0	12.653	17662.5000	326.5	2.3666	18.4855
4	302.4	150.0	12.658	17662.5000	361.3	2.3699	20.4558
5	302.0	149.7	12.565	17591.9207	356.6	2.3651	20.2707

Sampel : Beton Bertulang Sengkang *Wire Mesh* (BBSWM)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	302.8	151.1	13.120	17922.4999	349.1	2.4176	19.4783
2	301.4	150.0	12.937	17662.5000	378.1	2.4302	21.4069
3	301.6	150.5	13.025	17780.4463	371.8	2.4289	20.9106
4	302.0	150.5	12.938	17780.4463	355.5	2.4094	19.9939
5	302.4	150.4	12.990	17756.8256	356.1	2.4191	20.0543

KUAT DESAK BETON RATA-RATA UMUR 14 HARI

Sampel : Beton Tanpa Tulangan (BTT)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	300.8	150.7	12.682	17827.7346	451.8	2.3649	25.3425
2	300.5	150.0	12.597	17662.5000	424.8	2.3734	24.0510
3	300.1	150.5	12.670	17780.4463	463.6	2.3745	26.0736
4	300.9	150.2	12.750	17709.6314	436.3	2.3926	24.6363
5	300.8	150.0	12.656	17662.5000	462.9	2.3821	26.2081

Sampel : Beton Bertulang Sengkang (BBS)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	302.4	150.5	13.130	17780.4463	466.3	2.4420	26.2254
2	300.2	150.3	12.793	17733.2207	497.7	2.4031	28.0660
3	300.9	150.3	12.770	17733.2207	490.9	2.3932	27.6825
4	302.2	150.0	12.759	17662.5000	464.4	2.3904	26.2930
5	302.4	150.6	12.838	17804.0826	462.2	2.3845	25.9603

Sampel : Beton Bertulang *Wire Mesh* (BBWM)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	302.3	150.5	12.810	17780.4463	458.8	2.3832	25.8036
2	300.9	150.0	12.735	17662.5000	494.1	2.3962	27.9745
3	301.9	150.1	12.713	17686.0579	460.6	2.3810	26.0431
4	302.0	150.5	12.870	17780.4463	454.5	2.3968	25.5618
5	302.8	150.4	12.860	17756.8256	479.2	2.3918	26.9868

Sampel : Beton Bertulang Sengkang *Wire Mesh* (BBSWM)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	300.0	150.0	12.671	17662.5000	493.5	2.3913	27.9406
2	301.9	150.4	12.944	17756.8256	494.2	2.4146	27.8316
3	301.2	150.0	12.814	17662.5000	496.2	2.4087	28.0934
4	302.0	150.0	12.819	17662.5000	467.1	2.4032	26.4459
5	300.9	150.1	12.815	17686.0579	457.9	2.4080	25.8905

KUAT DESAK BETON RATA-RATA UMUR 28 HARI

Sampel : Beton Tanpa Tulangan (BTT)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	301.8	150.7	12.605	17827.7346	581.1	2.3428	32.5953
2	301.7	151.0	12.772	17898.7850	536.4	2.3652	29.9685
3	300.7	150.4	12.940	17756.8256	531.0	2.4235	29.9040
4	301.8	150.2	12.770	17709.6314	516.7	2.3893	29.1762
5	301.0	151.0	12.737	17898.7850	574.0	2.3642	32.0692

Sampel : Beton Bertulang Sengkang (BBS)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	301.5	150.0	12.865	17662.5000	595.8	2.4159	33.7325
2	302.1	150.5	13.100	17780.4463	585.7	2.4388	32.9407
3	301.3	150.4	13.050	17756.8256	583.7	2.4392	32.8719
4	302.2	151.3	13.192	17969.9767	594.5	2.4292	33.0830
5	301.0	151.2	12.960	17946.2304	583.9	2.3992	32.5361

Sampel : Beton Bertulang *Wire Mesh* (BBWM)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	303.7	150.2	13.090	17709.6314	553.5	2.4338	31.2542
2	302.0	150.0	12.887	17662.5000	589.9	2.4160	33.3984
3	301.7	150.0	12.955	17662.5000	561.8	2.4311	31.8075
4	303.5	150.0	12.942	17662.5000	588.7	2.4143	33.3305
5	301.4	151.0	13.010	17898.7850	560.5	2.4116	31.3150

Sampel : Beton Bertulang Sengkang *Wire Mesh* (BBSWM)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Desak (MPa)
	h (mm)	d (mm)	w (kg)				
1	303.1	149.7	13.192	17591.9207	616.7	2.4741	35.0559
2	301.4	150.2	13.140	17709.6314	623.5	2.4617	35.2068
3	301.8	150.0	13.033	17662.5000	616.2	2.4450	34.8875
4	302.7	150.0	13.431	17662.5000	626.8	2.5121	35.4876
5	301.5	150.4	13.095	17756.8256	606.2	2.4460	34.1390

LAMPIRAN 5

(Hasil Pengujian Kuat Desak Beton Karakteristik)

KUAT DESAK BETON KARAKTERISTIK UMUR 3 HARI

Sampel : Beton Tanpa Tulangan (BTT)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	14.0473	0.0892	0.0079
2	12.6936	-1.2645	1.5991
3	12.5753	-1.3828	1.9122
4	15.0545	1.0964	1.2020
5	15.4200	1.4619	2.1370
∑ =	69.7907		6.8583

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{69.7907}{5}$ = 13.9581 MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{6.8583}{5-1}}$ = 1.3094 MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 13.9581 – (1.64 x 1.3094) = 11.8107 MPa

Sampel : Beton Bertulang Sengkang (BBS)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	15.2561	-0.8223	0.6762
2	16.6011	0.5227	0.2732
3	16.6254	0.5470	0.2992
4	16.4812	0.4028	0.1622
5	15.4282	-0.6502	0.4228
∑ =	80.3920		1.8336

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{80.3920}{5}$ = 16.0784 MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{1.8336}{5-1}} = 0.6771$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 16.0784 – (1.64 x 0.6771) = 14.9680 MPa

Sampel : Beton Bertulang *Wire Mesh* (BBWM)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	15.9687	1.2024	1.4457
2	13.2244	-1.5419	2.3776
3	13.6661	-1.1002	1.2105
4	14.4686	-0.2977	0.0886
5	16.5039	1.7376	3.0191
∑ =	73.8317		8.1415

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{73.8317}{5} = 14.7663$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{8.1415}{5-1}} = 1.4267$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 14.7663 – (1.64 x 1.4267) = 12.4266 MPa

Sampel : Beton Bertulang Sengkang *Wire Mesh* (BBSWM)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	16.6246	-1.3479	1.8169
2	16.0170	-1.9555	3.8241
3	19.6008	1.6283	2.6512
4	19.8752	1.9027	3.6201
5	17.7451	-0.2274	0.0517
∑ =	89.8627		11.9642

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{89.8627}{5}$ = 17.9725 MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{11.9642}{5-1}}$ = 1.7295 MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 17.9725 – (1.64 x 1.7295) = 15.1362 MPa

KUAT DESAK BETON KARAKTERISTIK UMUR 7 HARI

Sampel : Beton Tanpa Tulangan (BTT)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	19.7680	1.1671	1.3621
2	19.1026	0.5017	0.2517
3	17.4068	-1.1941	1.4259
4	19.3366	0.7357	0.5413
5	17.3905	-1.2104	1.4651
∑ =	93.0045		5.0460

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{93.0045}{5} = 18.6009$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{5.0460}{5-1}} = 1.1232$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 18.6009 – (1.64 x 1.1232) = 16.7589 MPa

Sampel : Beton Bertulang Sengkang (BBS)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	20.4897	0.7259	0.5269
2	18.8742	-0.8896	0.7914
3	20.8294	1.0656	1.1355
4	19.4268	-0.3370	0.1136
5	19.1989	-0.5649	0.3191
∑ =	98.8190		2.8865

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{98.8190}{5} = 19.7638$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{2.8865}{5-1}} = 0.8495$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 19.7638 – (1.64 x 0.8495) = 18.3706 MPa

Sampel : Beton Bertulang *Wire Mesh* (BBWM)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	18.6553	-0.5510	0.3036
2	18.1644	-1.0419	1.0856
3	18.4855	-0.7208	0.5196
4	20.4558	1.2495	1.5612
5	20.2707	1.0644	1.1329
∑ =	96.0317		4.6029

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{96.0317}{5} = 19.2063$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{4.6029}{5-1}} = 1.0727$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 19.2063 – (1.64 x 1.0727) = 17.4471 MPa

Sampel : Beton Bertulang Sengkang *Wire Mesh* (BBSWM)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	19.4783	-0.8905	0.7930
2	21.4069	1.0381	1.0777
3	20.9106	0.5418	0.2935
4	19.9939	-0.3749	0.1406
5	20.0543	-0.3145	0.0989
∑ =	101.8440		2.4036

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{101.8440}{5}$ = 20.3688 MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{2.4036}{5-1}}$ = 0.7752 MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 20.3688 – (1.64 x 0.7752) = 19.0975 MPa

KUAT DESAK BETON KARAKTERISTIK UMUR 14 HARI

Sampel : Beton Tanpa Tulangan (BTT)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	25.3425	0.0802	0.0064
2	24.0510	-1.2113	1.4672
3	26.0736	0.8113	0.6582
4	24.6363	-0.6260	0.3919
5	26.2081	0.9458	0.8945
∑ =	126.3115		3.4183

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{126.3115}{5} = 25.2623$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{3.4183}{5-1}} = 0.9244$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 25.2623 – (1.64 x 0.9244) = 23.7462 MPa

Sampel : Beton Bertulang Sengkang (BBS)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	26.2254	-0.6200	0.3844
2	28.0660	1.2206	1.4898
3	27.6825	0.8371	0.7007
4	26.2930	-0.5524	0.3052
5	25.9603	-0.8851	0.7835
∑ =	134.2272		3.6635

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{134.2272}{5} = 26.8454$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{3.6635}{5-1}} = 0.9570$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 26.8454 – (1.64 x 0.9570) = 25.2759 MPa

Sampel : Beton Bertulang *Wire Mesh* (BBWM)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	25.8036	-0.6704	0.4494
2	27.9745	1.5005	2.2516
3	26.0431	-0.4309	0.1856
4	25.5618	-0.9122	0.8320
5	26.9868	0.5128	0.2630
∑ =	132.3698		3.9817

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{132.3698}{5} = 26.4740$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{3.9817}{5-1}} = 0.9977$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 26.4740 – (1.64 x 0.9977) = 24.8377 MPa

Sampel : Beton Bertulang Sengkang *Wire Mesh* (BBSWM)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	27.9406	0.7002	0.4903
2	27.8316	0.5912	0.3495
3	28.0934	0.8530	0.7276
4	26.4459	-0.7945	0.6312
5	25.8905	-1.3499	1.8222
∑ =	136.2020		4.0209

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{136.2020}{5} = 27.2404$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{4.0209}{5-1}} = 1.0026$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 27.2404 – (1.64 x 1.0026) = 25.5961 MPa

KUAT DESAK BETON KARAKTERISTIK UMUR 28 HARI

Sampel : Beton Tanpa Tulangan (BTT)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	32.5953	1.8527	3.4323
2	29.9685	-0.7741	0.5993
3	29.9040	-0.8386	0.7033
4	29.1762	-1.5664	2.4537
5	32.0692	1.3266	1.7598
∑ =	153.7132		8.9485

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{153.7132}{5} = 30.7426$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{8.9485}{5-1}} = 1.4957$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 30.7426 – (1.64 x 1.4957) = 28.2897 MPa

Sampel : Beton Bertulang Sengkang (BBS)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	33.7325	0.6997	0.4895
2	32.9407	-0.0921	0.0085
3	32.8719	-0.1609	0.0259
4	33.0830	0.0502	0.0025
5	32.5361	-0.4967	0.2468
∑ =	165.1642		0.7732

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{165.1642}{5} = 33.0328$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{0.7732}{5-1}} = 0.4397$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 33.0328 – (1.64 x 0.4397) = 32.3118 MPa

Sampel : Beton Bertulang *Wire Mesh* (BBWM)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	31.2542	-0.9669	0.9349
2	33.3984	1.1773	1.3860
3	31.8075	-0.4136	0.1711
4	33.3305	1.1094	1.2307
5	31.3150	-0.9061	0.8211
∑ =	161.1056		4.5438

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{161.1056}{5} = 32.2211$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{4.5438}{5-1}} = 1.0658$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 32.2211 – (1.64 x 1.0658) = 30.4732 MPa

Sampel : Beton Bertulang Sengkang *Wire Mesh* (BBSWM)

No	Kuat Desak (f'ci) (MPa)	f'ci – f'cr	(f'ci – f'cr)^2
1	35.0559	0.1005	0.0101
2	35.2068	0.2514	0.0632
3	34.8875	-0.0679	0.0046
4	35.4876	0.5322	0.2833
5	34.1390	-0.8164	0.6664
∑ =	174.7768		1.0277

Kuat Desak Rata-rata (f'cr) = $\frac{f'ci}{N} = \frac{174.7768}{5} = 34.9554$ MPa

Standar Deviasi (Sd) = $\sqrt{\frac{\sum(f'ci - f'cr)^2}{N-1}} = \sqrt{\frac{1.0277}{5-1}} = 0.5069$ MPa

Kuat Desak Karakteristik (f'c) = f'cr – (1.64 x Sd)

= 34.9554 – (1.64 x 0.5069) = 34.1241 MPa

LAMPIRAN 6

(Hasil Pengujian Kuat Tarik Beton Rata-rata)

KUAT TARIK BETON RATA-RATA UMUR 28 HARI

Sampel : Beton Tanpa Tulangan (BTT)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Tarik (MPa)
	h (mm)	d (mm)	w (kg)				
1	300.0	150.3	12.503	17733.2207	223.6	2.3502	3.1586
2	300.0	151.0	12.680	17898.7850	186.3	2.3614	2.6195
3	300.4	150.4	12.430	17756.8256	239.3	2.3303	3.3736
							3.0506

Sampel : Beton Bertulang Sengkang (BBS)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Tarik (MPa)
	h (mm)	d (mm)	w (kg)				
1	302.0	151.7	12.610	18065.1187	277.7	2.3114	3.8609
2	301.0	150.9	12.800	17875.0859	288.9	2.3790	4.0513
3	302.0	150.0	12.860	17662.5000	214.9	2.4109	3.0216
							3.6446

Sampel : Beton Bertulang *Wire Mesh* (BBWM)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Tarik (MPa)
	h (mm)	d (mm)	w (kg)				
1	300.0	150.6	12.563	17804.0826	172.6	2.3521	2.4333
2	300.2	150.1	13.165	17686.0579	346.4	2.4796	4.8965
3	300.2	150.8	13.135	17851.4024	220.4	2.4510	3.1010
							3.4769

Sampel : Beton Bertulang Sengkang *Wire Mesh* (BBSWM)

No	Beton			Luas (mm2)	Beban Maks (KN)	Berat Vol (t/m3)	Kuat Tarik (MPa)
	h (mm)	d (mm)	w (kg)				
1	300.2	150.3	13.015	17733.2207	282.8	2.4448	3.9922
2	299.1	150.3	12.800	17733.2207	253.3	2.4133	3.5889
3	301.1	150.0	12.950	17662.5000	345.1	2.4350	4.8668
							4.1493

LAMPIRAN 7

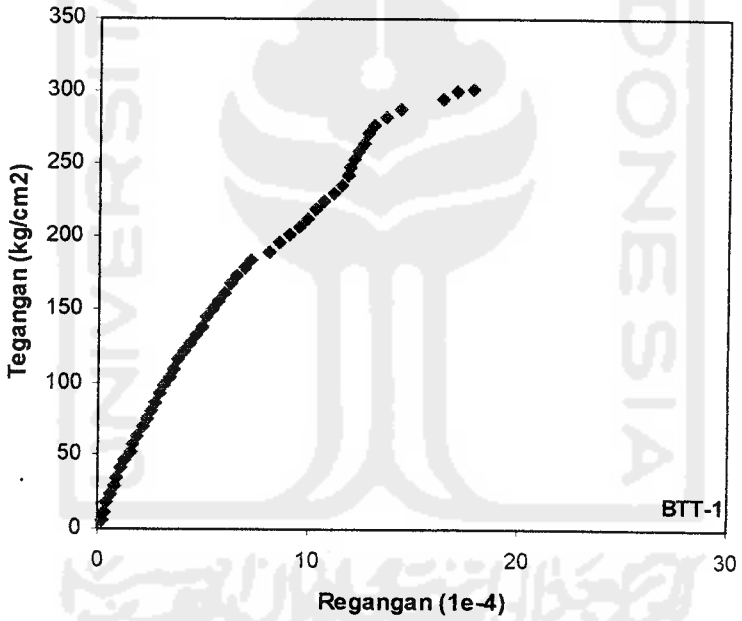
(Tabel dan Grafik Hubungan Tegangan-Regangan)

Sampel : Beton Tanpa Tulangan (BTT)

Diameter : 15.02 cm
Luas : 177.10 cm^2
Tinggi : 301.80 mm
Berat : 12.770 kg

BTT-1				
Beban (KN)	**Beban (Kg)**	**ΔL (10^-3) mm**	**Regangan (10^-4)**	**Tegangan (Kg/cm^2)**
10	1019.37	5	0.166	5.756
20	2038.74	9	0.298	11.512
30	3058.10	12	0.398	17.268
40	4077.47	16	0.530	23.024
50	5096.84	22	0.729	28.780
60	6116.21	27	0.895	34.536
70	7135.58	32	1.060	40.292
80	8154.94	38	1.259	46.048
90	9174.31	45	1.491	51.804
100	10193.68	50	1.657	57.560
110	11213.05	56	1.856	63.316
120	12232.42	63	2.087	69.072
130	13251.78	70	2.319	74.828
140	14271.15	75	2.485	80.584
150	15290.52	81	2.684	86.340
160	16309.89	87	2.883	92.096
170	17329.26	94	3.115	97.852
180	18348.62	102	3.380	103.608
190	19367.99	107	3.545	109.364
200	20387.36	114	3.777	115.120
210	21406.73	122	4.042	120.876
220	22426.10	130	4.307	126.632
230	23445.46	138	4.573	132.388
240	24464.83	148	4.904	138.144
250	25484.20	155	5.136	143.900
260	26503.57	162	5.368	149.656
270	27522.94	172	5.699	155.412
280	28542.30	180	5.964	161.168
290	29561.67	190	6.296	166.924
300	30581.04	197	6.528	172.680
310	31600.41	208	6.892	178.436
320	32619.78	219	7.256	184.192
330	33639.14	243	8.052	189.948
340	34658.51	257	8.516	195.704
350	35677.88	273	9.046	201.460
360	36697.25	286	9.476	207.216
370	37716.62	300	9.940	212.972
380	38735.98	310	10.272	218.728
390	39755.35	322	10.669	224.484

Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4)	Tegangan (Kg/cm^2)
400	40774.72	337	11.166	230.240
410	41794.09	347	11.498	235.996
420	42813.46	357	11.829	241.752
430	43832.82	359	11.895	247.508
440	44852.19	365	12.094	253.264
450	45871.56	371	12.293	259.020
460	46890.93	379	12.558	264.776
470	47910.30	387	12.823	270.532
480	48929.66	396	13.121	276.288
490	49949.03	412	13.651	282.044
500	50968.40	433	14.347	287.800
510	51987.77	494	16.368	293.556
520	53007.14	514	17.031	299.312
523.9	53404.69	537	17.793	301.557

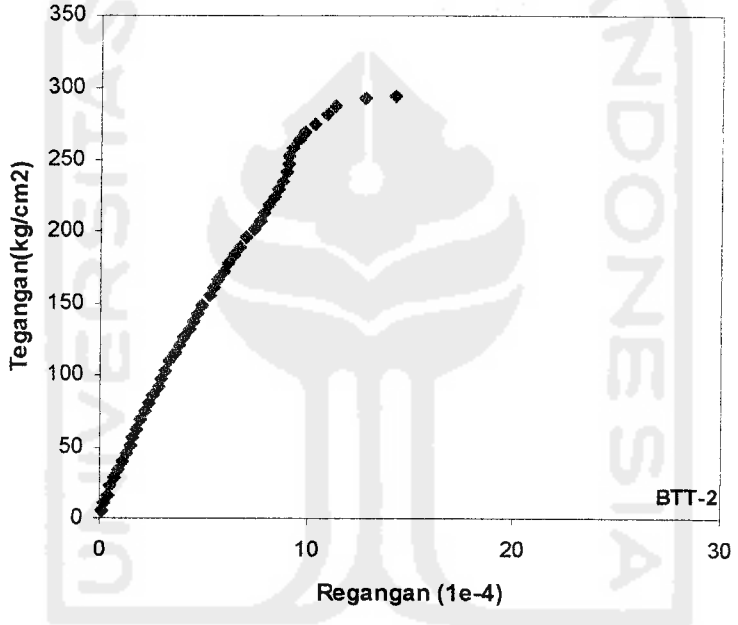


Grafik Tegangan Regangan BTT-1 Umur 28 Hari

Diameter : 15.04 cm
Luas : 177.57 cm^2
Tinggi : 301.70 mm
Berat : 12.755 kg

BTT-2				
Beban (KN)	**Beban (Kg)**	**ΔL (10^-3) mm**	**Regangan (10^-4)**	**Tegangan (Kg/cm^2)**
10	1019.37	2	0.066	5.741
20	2038.74	7	0.232	11.481
30	3058.10	11	0.365	17.222
40	4077.47	16	0.530	22.963
50	5096.84	21	0.696	28.704
60	6116.21	27	0.895	34.444
70	7135.58	33	1.094	40.185
80	8154.94	38	1.260	45.926
90	9174.31	43	1.425	51.666
100	10193.68	48	1.591	57.407
110	11213.05	54	1.790	63.148
120	12232.42	60	1.989	68.889
130	13251.78	65	2.154	74.629
140	14271.15	71	2.353	80.370
150	15290.52	77	2.552	86.111
160	16309.89	84	2.784	91.851
170	17329.26	89	2.950	97.592
180	18348.62	95	3.149	103.333
190	19367.99	101	3.348	109.074
200	20387.36	108	3.580	114.814
210	21406.73	114	3.779	120.555
220	22426.10	120	3.977	126.296
230	23445.46	128	4.243	132.036
240	24464.83	134	4.441	137.777
250	25484.20	140	4.640	143.518
260	26503.57	146	4.839	149.258
270	27522.94	158	5.237	154.999
280	28542.30	164	5.436	160.740
290	29561.67	169	5.602	166.481
300	30581.04	179	5.933	172.221
310	31600.41	185	6.132	177.962
320	32619.78	194	6.430	183.703
330	33639.14	204	6.762	189.443
340	34658.51	213	7.060	195.184
350	35677.88	222	7.358	200.925
360	36697.25	231	7.657	206.666
370	37716.62	239	7.922	212.406
380	38735.98	245	8.121	218.147
390	39755.35	252	8.353	223.888
400	40774.72	258	8.552	229.628
410	41794.09	264	8.750	235.369

Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4)	Tegangan (Kg/cm^2)
420	42813.46	271	8.982	241.110
430	43832.82	272	9.016	246.851
440	44852.19	274	9.082	252.591
450	45871.56	280	9.281	258.332
460	46890.93	288	9.546	264.073
470	47910.30	298	9.877	269.813
480	48929.66	312	10.341	275.554
490	49949.03	328	10.872	281.295
500	50968.40	342	11.336	287.036
510	51987.77	385	12.761	292.776
512.7	52263.00	428	14.186	294.326



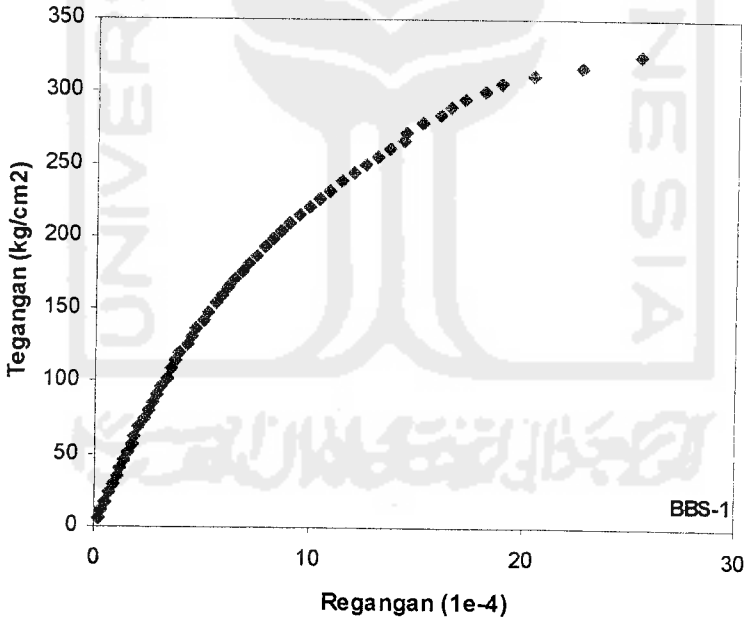
Grafik Tegangan Regangan BTT-2 Umur 28 Hari

Sampel : Beton Bertulang Sengkang (BBS)

Diameter : 15.13 cm
Luas : 179.70 cm^2
Tinggi : 302.20 mm
Berat : 13.192 kg

BBS-1				
Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4)	Tegangan (Kg/cm^2)
10	1019.37	5	0.165	5.673
20	2038.74	9	0.298	11.345
30	3058.10	14	0.463	17.018
40	4077.47	20	0.662	22.690
50	5096.84	25	0.827	28.363
60	6116.21	30	0.993	34.036
70	7135.58	35	1.158	39.708
80	8154.94	40	1.324	45.381
90	9174.31	45	1.489	51.054
100	10193.68	50	1.655	56.726
110	11213.05	55	1.820	62.399
120	12232.42	61	2.019	68.071
130	13251.78	67	2.217	73.744
140	14271.15	74	2.449	79.417
150	15290.52	80	2.647	85.089
160	16309.89	86	2.846	90.762
170	17329.26	92	3.044	96.434
180	18348.62	99	3.276	102.107
190	19367.99	105	3.475	107.780
200	20387.36	111	3.673	113.452
210	21406.73	118	3.905	119.125
220	22426.10	127	4.203	124.798
230	23445.46	134	4.434	130.470
240	24464.83	141	4.666	136.143
250	25484.20	150	4.964	141.815
260	26503.57	158	5.228	147.488
270	27522.94	167	5.526	153.161
280	28542.30	176	5.824	158.833
290	29561.67	185	6.122	164.506
300	30581.04	195	6.453	170.179
310	31600.41	205	6.784	175.851
320	32619.78	215	7.114	181.524
330	33639.14	225	7.445	187.196
340	34658.51	236	7.809	192.869
350	35677.88	247	8.173	198.542
360	36697.25	259	8.570	204.214
370	37716.62	270	8.934	209.887
380	38735.98	285	9.431	215.559
390	39755.35	299	9.894	221.232

Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4)	Tegangan (Kg/cm^2)
400	40774.72	313	10.357	226.905
410	41794.09	328	10.854	232.577
420	42813.46	345	11.416	238.250
430	43832.82	361	11.946	243.923
440	44852.19	379	12.541	249.595
450	45871.56	395	13.071	255.268
460	46890.93	413	13.666	260.940
470	47910.30	434	14.361	266.613
480	48929.66	435	14.394	272.286
490	49949.03	458	15.156	277.958
500	50968.40	484	16.016	283.631
510	51987.77	498	16.479	289.303
520	53007.14	518	17.141	294.976
530	54026.50	548	18.134	300.649
540	55045.87	570	18.862	306.321
550	56065.24	615	20.351	311.994
560	57084.61	685	22.667	317.667
574	58511.72	767	25.381	325.608

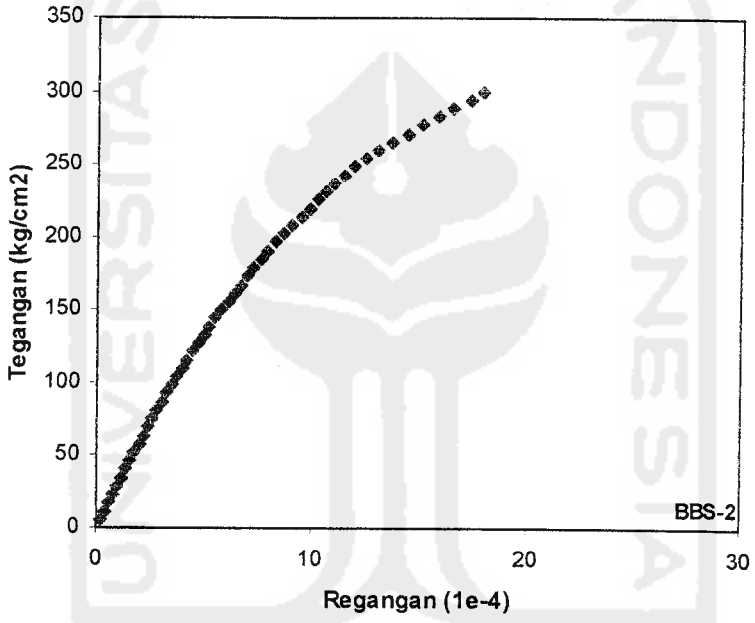


Grafik Tegangan Regangan BBS-1 Umur 28 Hari

Diameter : 15.00 cm
Luas : 176.63 cm^2
Tinggi : 301.30 mm
Berat : 12.978 kg

BBS-2				
Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4)	Tegangan (Kg/cm^2)
10	1019.37	6	0.199	5.771
20	2038.74	12	0.398	11.543
30	3058.10	17	0.564	17.314
40	4077.47	22	0.730	23.085
50	5096.84	28	0.929	28.857
60	6116.21	34	1.128	34.628
70	7135.58	40	1.328	40.400
80	8154.94	46	1.527	46.171
90	9174.31	52	1.726	51.942
100	10193.68	59	1.958	57.714
110	11213.05	65	2.157	63.485
120	12232.42	72	2.390	69.256
130	13251.78	76	2.522	75.028
140	14271.15	83	2.755	80.799
150	15290.52	90	2.987	86.571
160	16309.89	97	3.219	92.342
170	17329.26	104	3.452	98.113
180	18348.62	111	3.684	103.885
190	19367.99	118	3.916	109.656
200	20387.36	125	4.149	115.427
210	21406.73	133	4.414	121.199
220	22426.10	141	4.680	126.970
230	23445.46	149	4.945	132.741
240	24464.83	157	5.211	138.513
250	25484.20	165	5.476	144.284
260	26503.57	174	5.775	150.056
270	27522.94	183	6.074	155.827
280	28542.30	192	6.372	161.598
290	29561.67	200	6.638	167.370
300	30581.04	210	6.970	173.141
310	31600.41	219	7.269	178.912
320	32619.78	229	7.600	184.684
330	33639.14	239	7.932	190.455
340	34658.51	250	8.297	196.227
350	35677.88	261	8.662	201.998
360	36697.25	272	9.028	207.769
370	37716.62	285	9.459	213.541
380	38735.98	297	9.857	219.312
390	39755.35	309	10.256	225.083
400	40774.72	320	10.621	230.855
410	41794.09	332	11.019	236.626

Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4	Tegangan (Kg/cm^2
420	42813.46	345	11.450	242.397
430	43832.82	359	11.915	248.169
440	44852.19	377	12.512	253.940
450	45871.56	395	13.110	259.712
460	46890.93	415	13.774	265.483
470	47910.30	436	14.471	271.254
480	48929.66	457	15.168	277.026
490	49949.03	480	15.931	282.797
500	50968.40	500	16.595	288.568
510	51987.77	525	17.424	294.340
519.1	52915.39	542	17.989	299.592



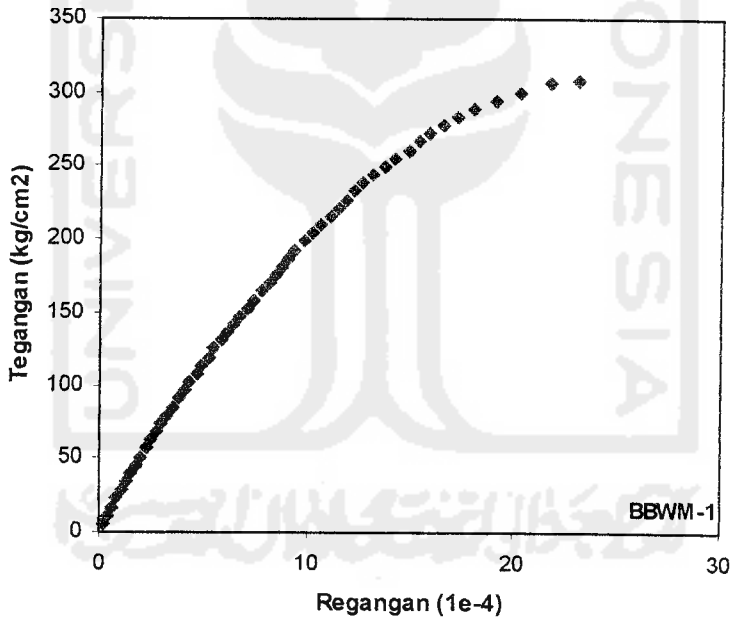
Grafik Tegangan Regangan BBS-2 Umur 28 Hari

Sampel : Beton Bertulang *Wire Mesh* (BBWM)

Diameter : 15.14 cm
Luas : 179.94 cm^2
Tinggi : 301.20 mm
Berat : 12.843 kg

BBWM-1				
Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4)	Tegangan (Kg/cm^2)
10	1019.37	6	0.199	5.665
20	2038.74	11	0.365	11.330
30	3058.10	17	0.564	16.995
40	4077.47	24	0.797	22.661
50	5096.84	31	1.029	28.326
60	6116.21	37	1.228	33.991
70	7135.58	45	1.494	39.656
80	8154.94	53	1.760	45.321
90	9174.31	60	1.992	50.986
100	10193.68	67	2.224	56.651
110	11213.05	74	2.457	62.316
120	12232.42	82	2.722	67.982
130	13251.78	89	2.955	73.647
140	14271.15	97	3.220	79.312
150	15290.52	105	3.486	84.977
160	16309.89	113	3.752	90.642
170	17329.26	122	4.050	96.307
180	18348.62	130	4.316	101.972
190	19367.99	140	4.648	107.637
200	20387.36	148	4.914	113.303
210	21406.73	157	5.212	118.968
220	22426.10	165	5.478	124.633
230	23445.46	176	5.843	130.298
240	24464.83	185	6.142	135.963
250	25484.20	194	6.441	141.628
260	26503.57	203	6.740	147.293
270	27522.94	214	7.105	152.958
280	28542.30	224	7.437	158.624
290	29561.67	234	7.769	164.289
300	30581.04	245	8.134	169.954
310	31600.41	255	8.466	175.619
320	32619.78	264	8.765	181.284
330	33639.14	274	9.097	186.949
340	34658.51	283	9.396	192.614
350	35677.88	297	9.861	198.279
360	36697.25	308	10.226	203.945
370	37716.62	320	10.624	209.610
380	38735.98	333	11.056	215.275
390	39755.35	347	11.521	220.940

Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4)	Tegangan (Kg/cm^2)
400	40774.72	358	11.886	226.605
410	41794.09	370	12.284	232.270
420	42813.46	381	12.649	237.935
430	43832.82	397	13.181	243.600
440	44852.19	414	13.745	249.266
450	45871.56	428	14.210	254.931
460	46890.93	448	14.874	260.596
470	47910.30	464	15.405	266.261
480	48929.66	478	15.870	271.926
490	49949.03	498	16.534	277.591
500	50968.40	519	17.231	283.256
510	51987.77	544	18.061	288.921
520	53007.14	575	19.090	294.587
530	54026.50	610	20.252	300.252
540	55045.87	654	21.713	305.917
542.7	55321.10	694	23.041	307.446

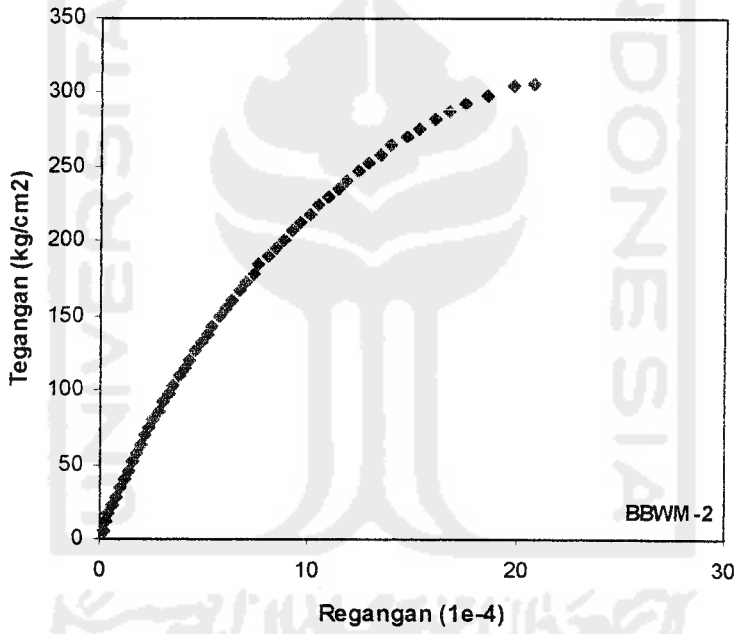


Grafik Tegangan Regangan BBWM-1 Umur 28 Hari

Diameter : 15.04 cm
Luas : 177.57 cm^2
Tinggi : 302.00 mm
Berat : 12.975 kg

BBWM-2				
Beban (KN)	**Beban (Kg)**	**ΔL (10^-3) mm**	**Regangan (10^-4)**	**Tegangan (Kg/cm^2)**
10	1019.37	6	0.199	5.741
20	2038.74	9	0.298	11.481
30	3058.10	13	0.430	17.222
40	4077.47	18	0.596	22.963
50	5096.84	24	0.795	28.704
60	6116.21	30	0.993	34.444
70	7135.58	35	1.159	40.185
80	8154.94	41	1.358	45.926
90	9174.31	46	1.523	51.666
100	10193.68	53	1.755	57.407
110	11213.05	59	1.954	63.148
120	12232.42	65	2.152	68.889
130	13251.78	71	2.351	74.629
140	14271.15	77	2.550	80.370
150	15290.52	85	2.815	86.111
160	16309.89	92	3.046	91.851
170	17329.26	99	3.278	97.592
180	18348.62	105	3.477	103.333
190	19367.99	113	3.742	109.074
200	20387.36	122	4.040	114.814
210	21406.73	130	4.305	120.555
220	22426.10	137	4.536	126.296
230	23445.46	145	4.801	132.036
240	24464.83	154	5.099	137.777
250	25484.20	162	5.364	143.518
260	26503.57	172	5.695	149.258
270	27522.94	180	5.960	154.999
280	28542.30	189	6.258	160.740
290	29561.67	201	6.656	166.481
300	30581.04	210	6.954	172.221
310	31600.41	221	7.318	177.962
320	32619.78	228	7.550	183.703
330	33639.14	242	8.013	189.443
340	34658.51	254	8.411	195.184
350	35677.88	265	8.775	200.925
360	36697.25	278	9.205	206.666
370	37716.62	290	9.603	212.406
380	38735.98	303	10.033	218.147
390	39755.35	315	10.430	223.888
400	40774.72	330	10.927	229.628
410	41794.09	344	11.391	235.369

Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4)	Tegangan (Kg/cm^2)
420	42813.46	358	11.854	241.110
430	43832.82	375	12.417	246.851
440	44852.19	390	12.914	252.591
450	45871.56	406	13.444	258.332
460	46890.93	422	13.974	264.073
470	47910.30	443	14.669	269.813
480	48929.66	462	15.298	275.554
490	49949.03	484	16.026	281.295
500	50968.40	506	16.755	287.036
510	51987.77	530	17.550	292.776
520	53007.14	562	18.609	298.517
530	54026.50	599	19.834	304.258
533.1	54342.51	628	20.795	306.037



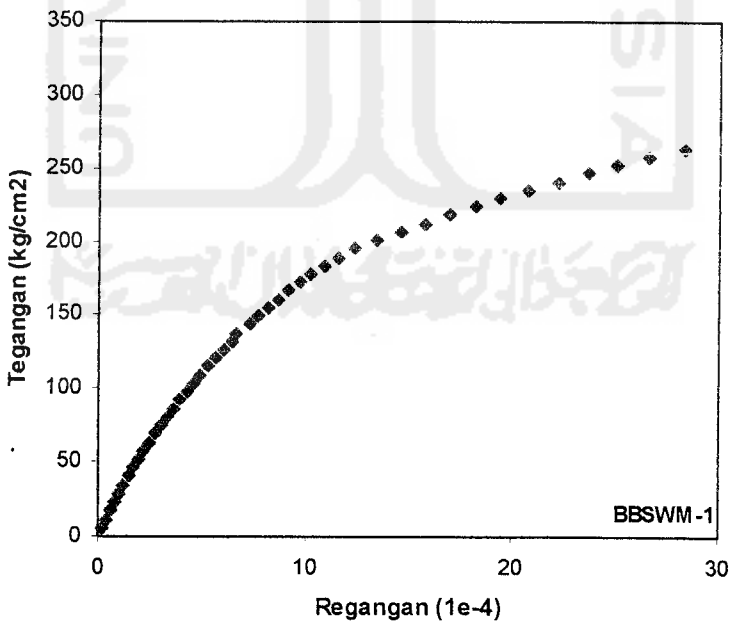
Grafik Tegangan Regangan BBWM-2 Umur 28 Hari

Sampel : Beton Bertulang Sengkang *Wire Mesh* (BBSWM)

Diameter : 15.05 cm
Luas : 177.80 cm^2
Tinggi : 301.70 mm
Berat : 13.164 kg

BBSWM-1				
Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4)	Tegangan (Kg/cm^2)
10	1019.37	6	0.199	5.733
20	2038.74	11	0.365	11.466
30	3058.10	17	0.563	17.199
40	4077.47	23	0.762	22.932
50	5096.84	30	0.994	28.665
60	6116.21	36	1.193	34.399
70	7135.58	43	1.425	40.132
80	8154.94	50	1.657	45.865
90	9174.31	58	1.922	51.598
100	10193.68	66	2.188	57.331
110	11213.05	74	2.453	63.064
120	12232.42	83	2.751	68.797
130	13251.78	91	3.016	74.530
140	14271.15	100	3.315	80.263
150	15290.52	110	3.646	85.996
160	16309.89	119	3.944	91.729
170	17329.26	128	4.243	97.462
180	18348.62	138	4.574	103.196
190	19367.99	148	4.906	108.929
200	20387.36	158	5.237	114.662
210	21406.73	170	5.635	120.395
220	22426.10	181	5.999	126.128
230	23445.46	195	6.463	131.861
240	24464.83	200	6.629	137.594
250	25484.20	219	7.259	143.327
260	26503.57	232	7.690	149.060
270	27522.94	247	8.187	154.793
280	28542.30	262	8.684	160.526
290	29561.67	275	9.115	166.259
300	30581.04	293	9.712	171.993
310	31600.41	309	10.242	177.726
320	32619.78	328	10.872	183.459
330	33639.14	349	11.568	189.192
340	34658.51	374	12.396	194.925
350	35677.88	405	13.424	200.658
360	36697.25	440	14.584	206.391
370	37716.62	475	15.744	212.124
380	38735.98	510	16.904	217.857
390	39755.35	550	18.230	223.590

Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4)	Tegangan (Kg/cm^2)
400	40774.72	585	19.390	229.323
410	41794.09	626	20.749	235.056
420	42813.46	669	22.174	240.790
430	43832.82	713	23.633	246.523
440	44852.19	756	25.058	252.256
450	45871.56	802	26.583	257.989
460	46890.93	856	28.373	263.722
470	47910.30	915	30.328	269.455
480	48929.66	969	32.118	275.188
490	49949.03	1013	33.576	280.921
500	50968.40	1080	35.797	286.654
510	51987.77	1149	38.084	292.387
520	53007.14	1211	40.139	298.120
530	54026.50	1298	43.023	303.853
540	55045.87	1382	45.807	309.587
547.8	55840.98	1454	48.194	314.058
548	55861.37	1582	52.436	314.173
550	56065.24	1651	54.723	315.320
555	56574.92	1717	56.911	318.186
557.5	56829.77	1772	58.734	319.619
558.1	56890.93	1810	59.993	319.963
555	56574.92	1910	63.308	318.186
565.2	57614.68	1989	65.926	324.034

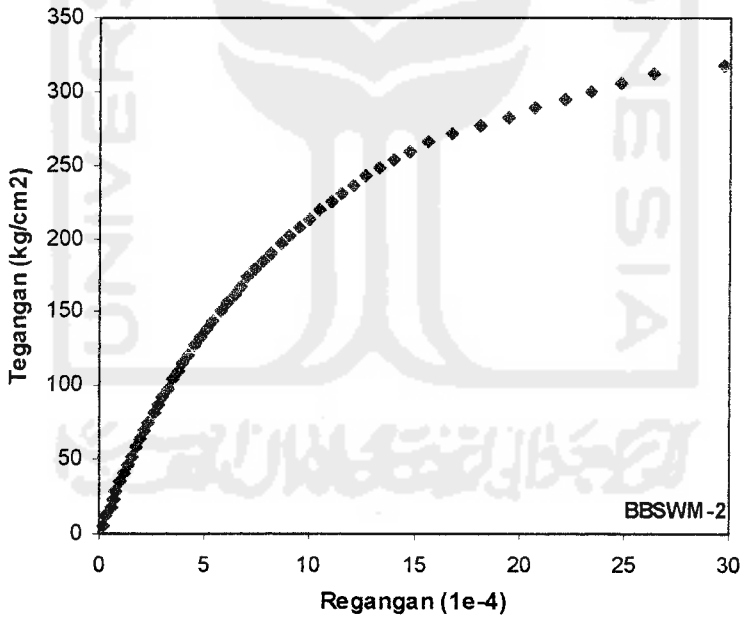


Grafik Tegangan Regangan BBSWM-1 Umur 28 Hari

Diameter : 15.00 cm
Luas : 176.63 cm^2
Tinggi : 302.70 mm
Berat : 13.430 kg

BBSWM-2				
Beban (KN)	**Beban (Kg)**	**ΔL (10^-3) mm**	**Regangan (10^-4)**	**Tegangan (Kg/cm^2)**
10	1019.37	6	0.198	5.771
20	2038.74	10	0.330	11.543
30	3058.10	16	0.529	17.314
40	4077.47	20	0.661	23.085
50	5096.84	24	0.793	28.857
60	6116.21	29	0.958	34.628
70	7135.58	35	1.156	40.400
80	8154.94	40	1.321	46.171
90	9174.31	46	1.520	51.942
100	10193.68	52	1.718	57.714
110	11213.05	58	1.916	63.485
120	12232.42	65	2.147	69.256
130	13251.78	71	2.346	75.028
140	14271.15	77	2.544	80.799
150	15290.52	85	2.808	86.571
160	16309.89	91	3.006	92.342
170	17329.26	98	3.238	98.113
180	18348.62	105	3.469	103.885
190	19367.99	112	3.700	109.656
200	20387.36	120	3.964	115.427
210	21406.73	128	4.229	121.199
220	22426.10	136	4.493	126.970
230	23445.46	145	4.790	132.741
240	24464.83	154	5.088	138.513
250	25484.20	163	5.385	144.284
260	26503.57	173	5.715	150.056
270	27522.94	183	6.046	155.827
280	28542.30	193	6.376	161.598
290	29561.67	203	6.706	167.370
300	30581.04	213	7.037	173.141
310	31600.41	224	7.400	178.912
320	32619.78	236	7.796	184.684
330	33639.14	248	8.193	190.455
340	34658.51	260	8.589	196.227
350	35677.88	274	9.052	201.998
360	36697.25	287	9.481	207.769
370	37716.62	301	9.944	213.541
380	38735.98	315	10.406	219.312
390	39755.35	333	11.001	225.083
400	40774.72	349	11.530	230.855
410	41794.09	365	12.058	236.626

Beban (KN)	Beban (Kg)	ΔL (10^-3) mm	Regangan (10^-4)	Tegangan (Kg/cm^2)
420	42813.46	384	12.686	242.397
430	43832.82	403	13.314	248.169
440	44852.19	423	13.974	253.940
450	45871.56	446	14.734	259.712
460	46890.93	473	15.626	265.483
470	47910.30	507	16.749	271.254
480	48929.66	549	18.137	277.026
490	49949.03	590	19.491	282.797
500	50968.40	628	20.747	288.568
510	51987.77	670	22.134	294.340
520	53007.14	708	23.389	300.111
530	54026.50	752	24.843	305.883
540	55045.87	797	26.330	311.654
550	56065.24	898	29.666	317.425
560	57084.61	925	30.558	323.197
570	58103.98	1058	34.952	328.968
595	60652.40	1505	49.719	343.396
604.4	61610.60	1627	53.750	348.822



Grafik Tegangan Regangan BBSWM-2 Umur 28 Hari

LAMPIRAN 8

(Tabel Modulus Elastisitas, Modulus Kenyal & Kekakuan)

TABEL MODULUS ELASTISITAS, MODULUS KENYAL DAN KEKAKUAN

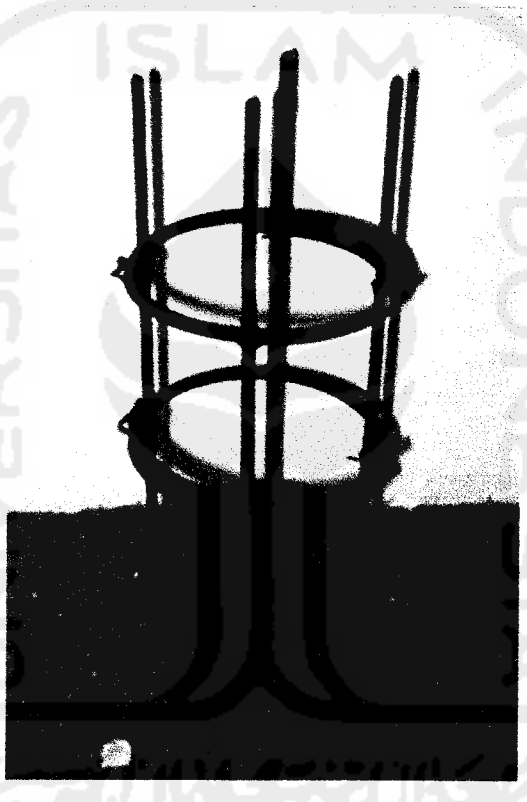
Tipe	**BTT**	**BBS**	**BBWM**	**BBSWM**
σ maks (kg/cm^2)	294.666	311.317	307.989	385.288
0.4 σ maks (kg/cm^2)	117.8664	124.5266	123.1958	154.1150
ε (10^-4)	4.2561	4.6949	5.4659	7.9507
ε 0.2 %	3.78	4.16	4.84	7.06
σ 0.2 (kg/cm^2)	272	288	284	356
Beban P (kg)	48170	51754	51102	62879
ΔL (10^-3) (mm)	114.1	125.7	145.8	213.7
Kekakuan K (kg/cm)	4222477.9548	4116728.3472	3505414.8162	2942287.1213
Modulus Elastisitas (MPa)	27167.4685	26019.7430	22110.5713	19015.4853
Modulus Kenyal (kg/cm^2)	0.0251	0.0292	0.0337	0.0613

LAMPIRAN 9

(Dokumentasi Pelaksanaan Penelitian)

DOKUMENTASI PELAKSANAAN PENELITIAN

Gambar Variasi Pengekang

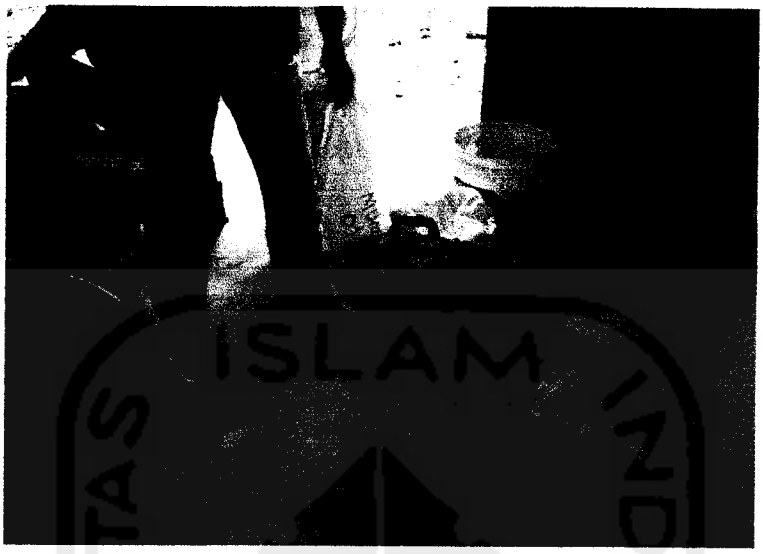


Pengekang Sengkang

Pengekang *Wire Mesh*

Pengekang Gabungan (Sengkang dan *Wire Mesh*)

Gambar Pembuatan Campuran Beton



Penimbangan Material

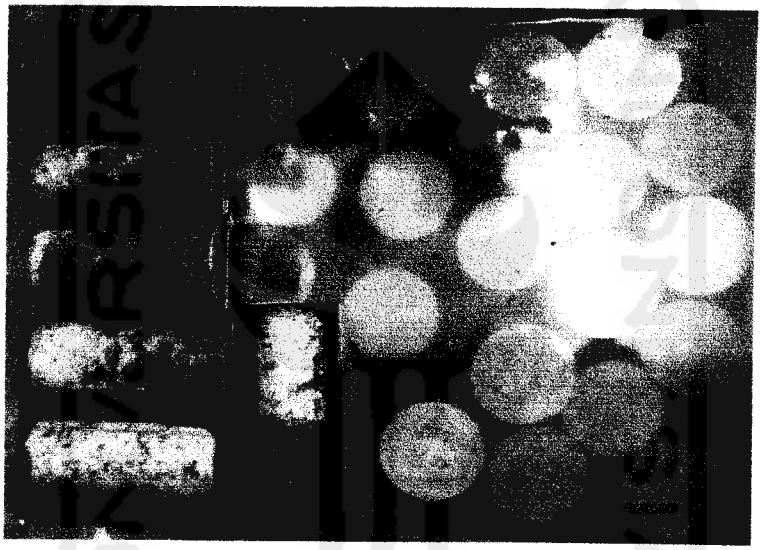
Pengadukan Campuran Beton

Pengujian *Slump*

Gambar Pembuatan Benda Uji

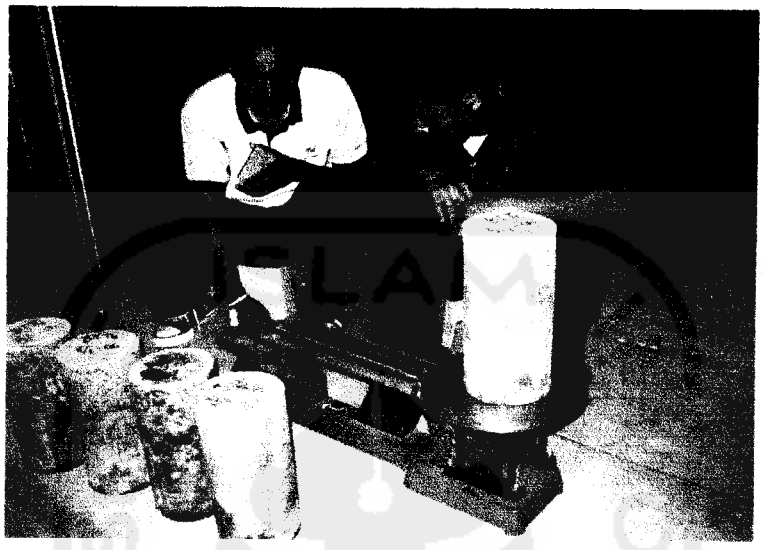
Proses Pencetakan Silinder

Gambar Perawatan Benda Uji



Perendaman Benda Uji

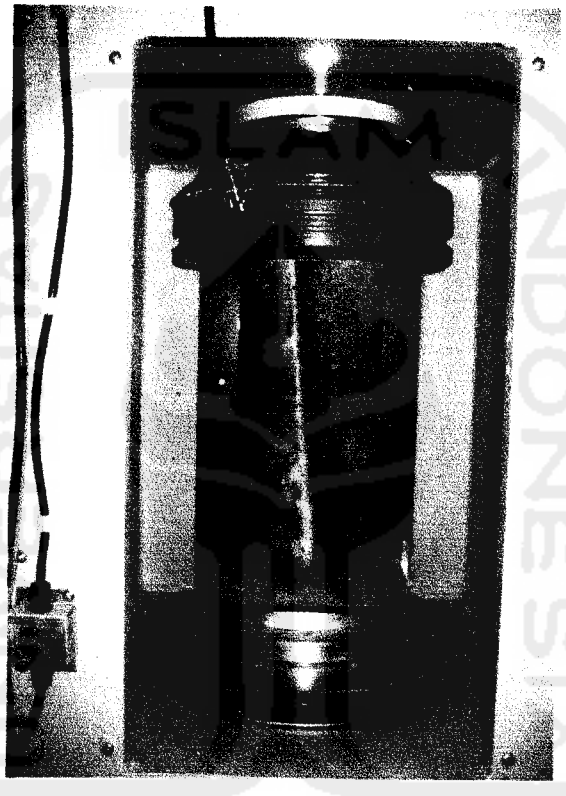
Gambar Penimbangan dan Pengukuran Benda Uji



Penimbangan Benda Uji

Pengukuran Benda Uji

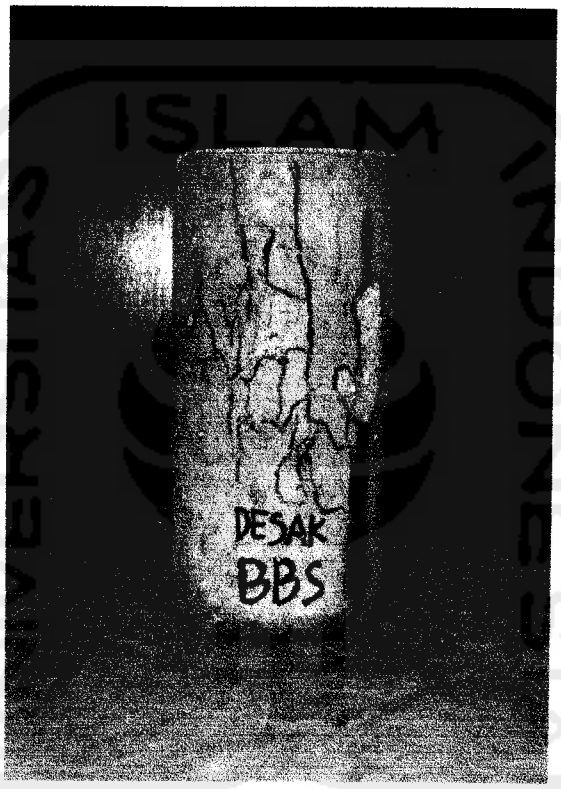
Gambar Pengujian Benda Uji



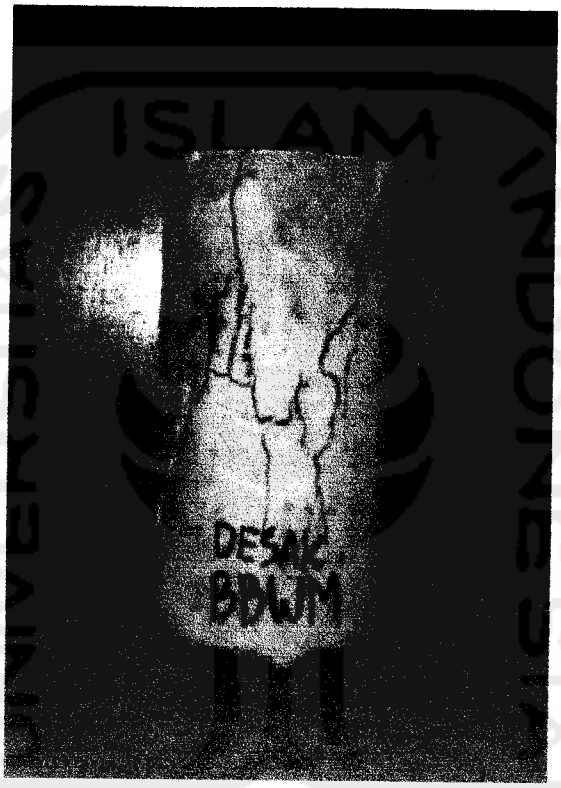
Pengujian Desak

Gambar Hasil Pengujian Benda Uji

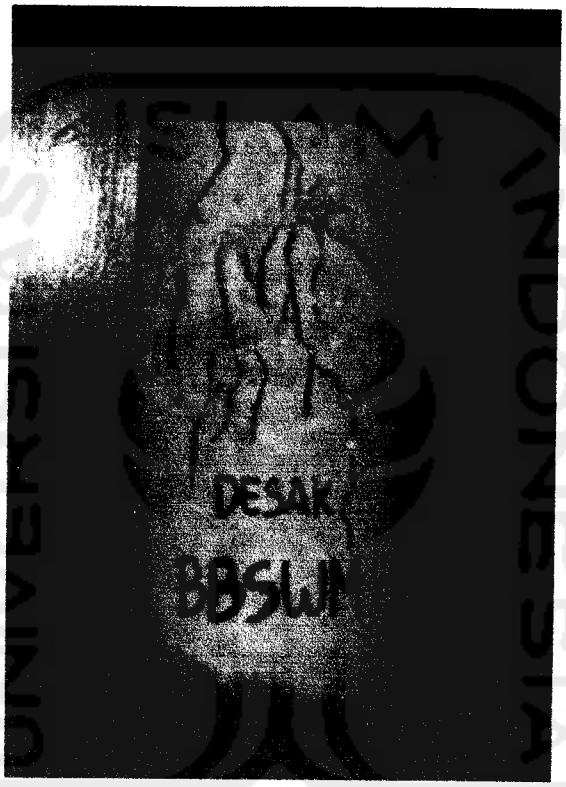
Hasil Uji Desak BTT



Hasil Uji Desak BBS

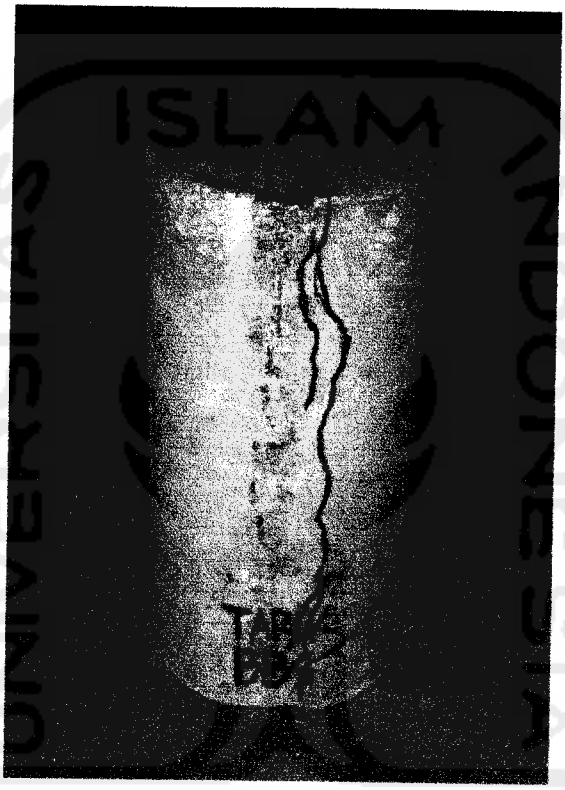


Hasil Uji Desak BBWM



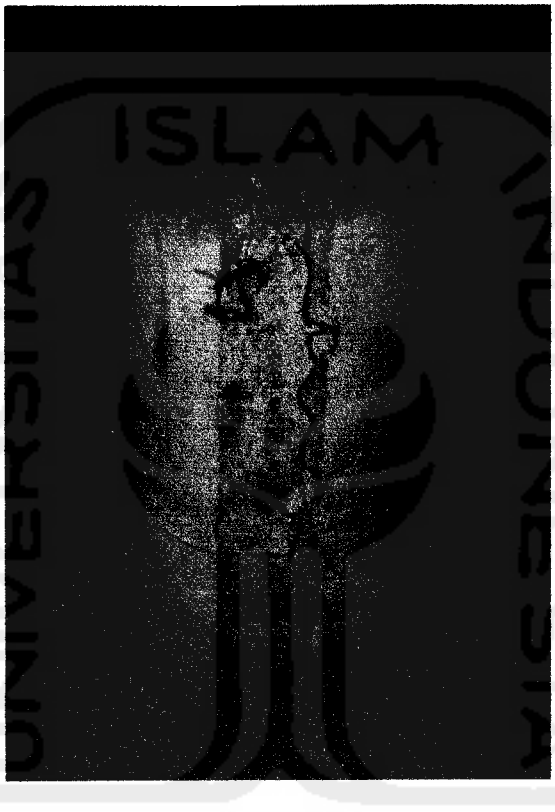
Hasil Uji Desak BBSWM

Hasil Uji Tarik BTT



Hasil Uji Tarik BBS

Hasil Uji Tarik BBWM



Hasil Uji Tarik BBSWM