

LAMPIRAN A-1

Proses pencacahan limbah gelas plastik minuman



1. Limbah gelas plastik dibersihkan
2. Bagian atas (tutup) limbah gelas plastik dipotong



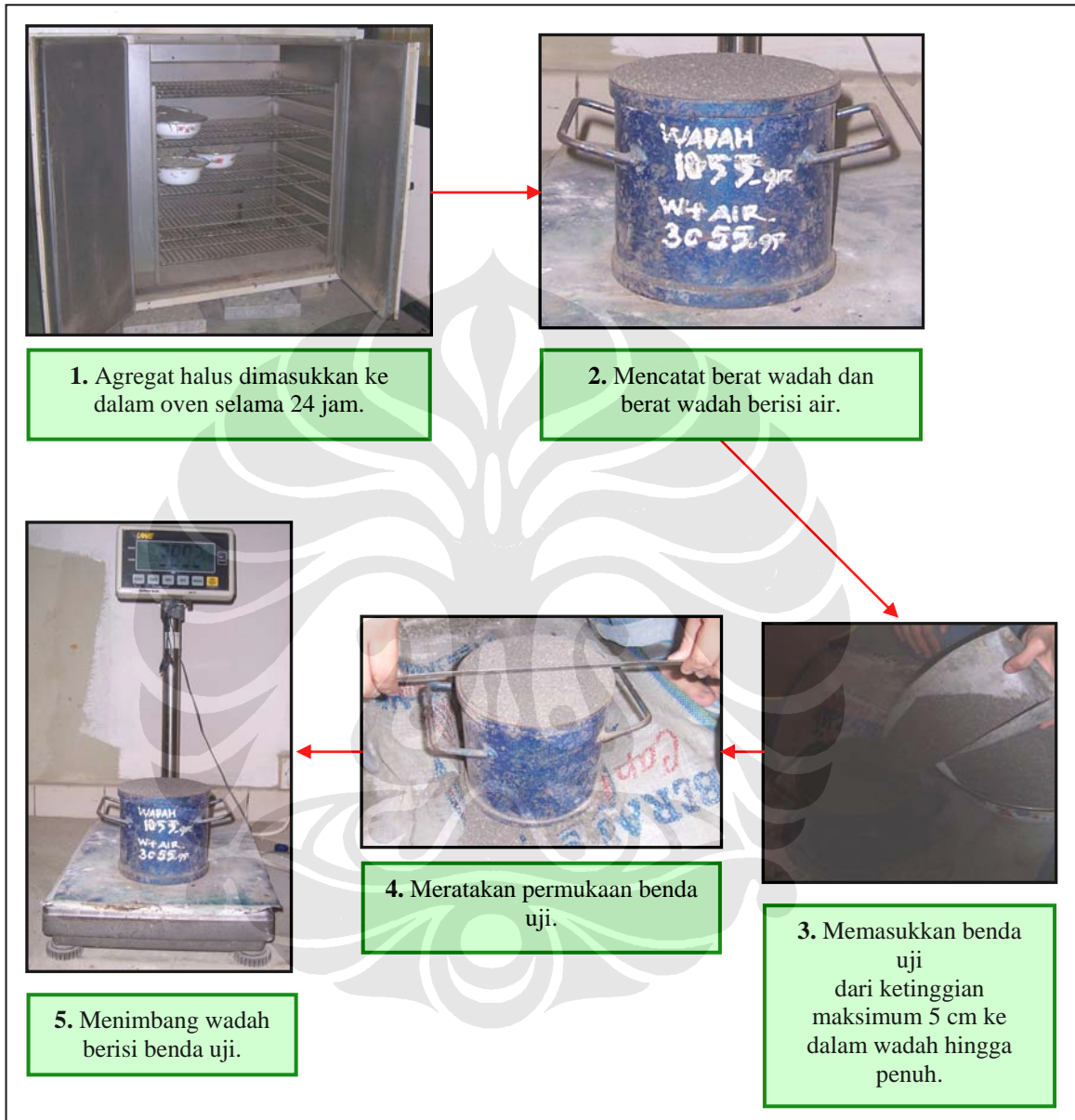
3. Limbah gelas plastik dimasukkan ke dalam mesin pencacah



4. Dihasilkan cacahan limbah gelas plastik PP dengan dimensi 3 - 25 mm

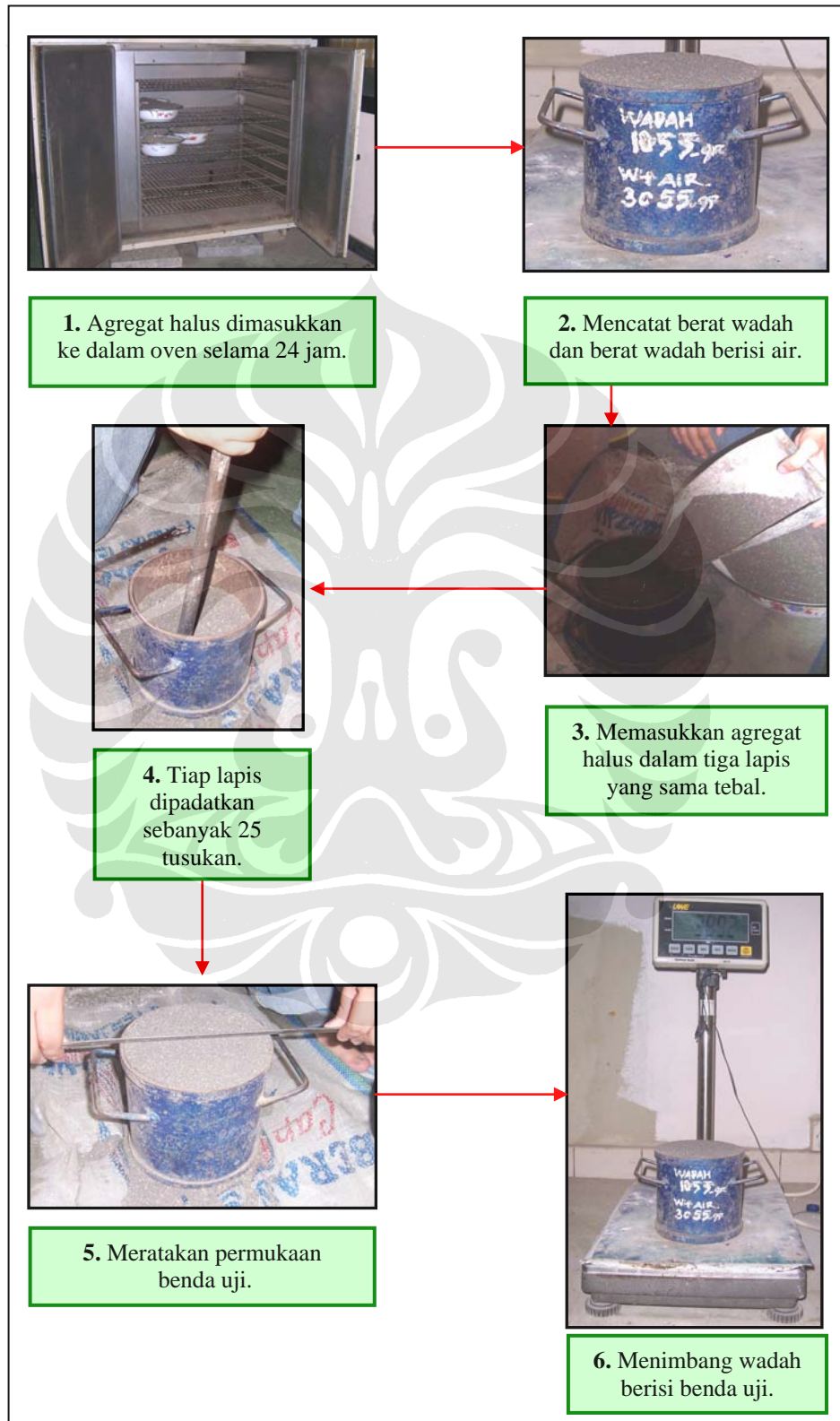
LAMPIRAN A-2

Proses pemeriksaan berat isi agregat halus dengan metode berat isi lepas (ASTM C – 29)



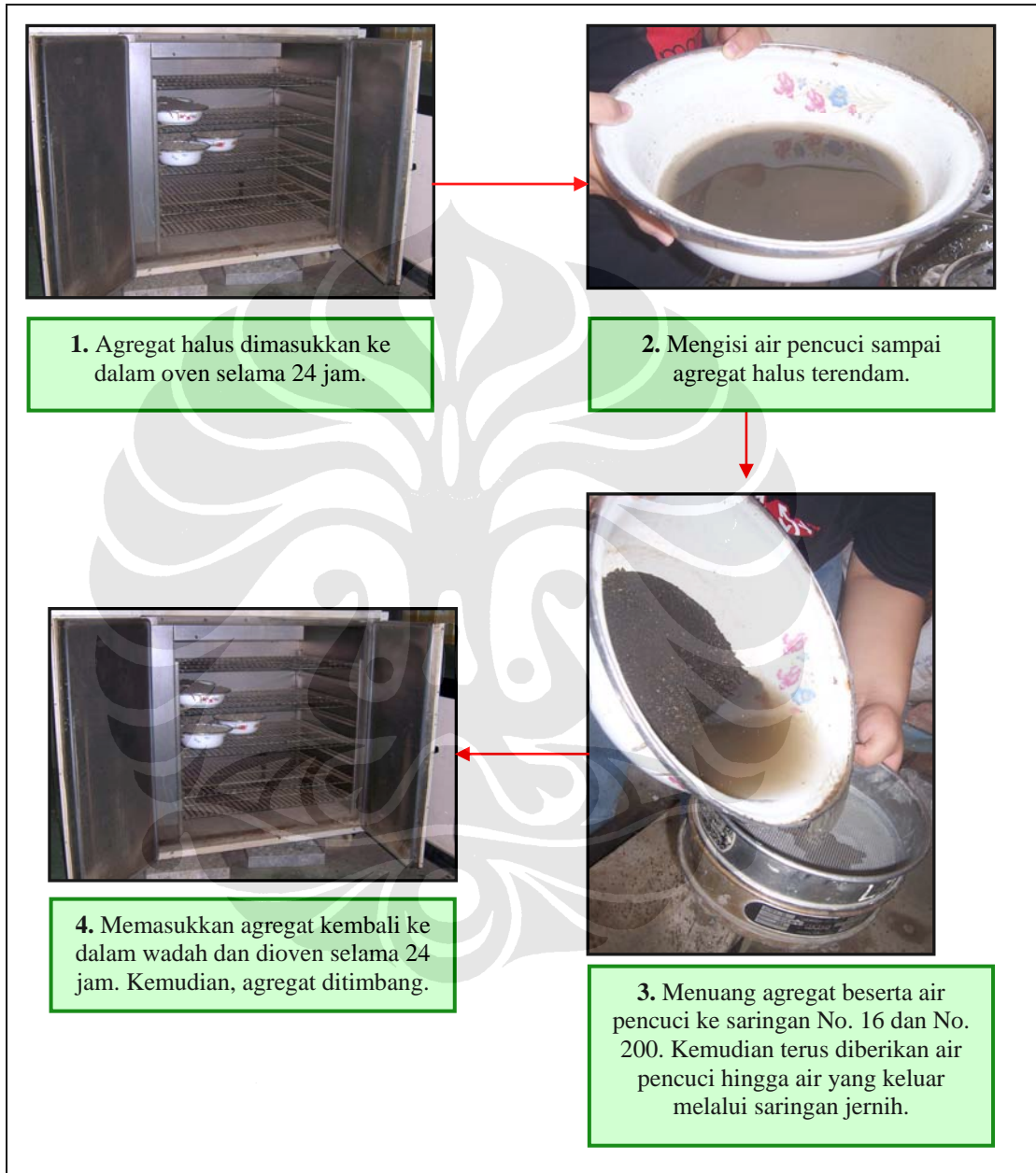
LAMPIRAN A-3

Proses pemeriksaan berat isi agregat halus dengan metode penusukan (ASTM C - 29)



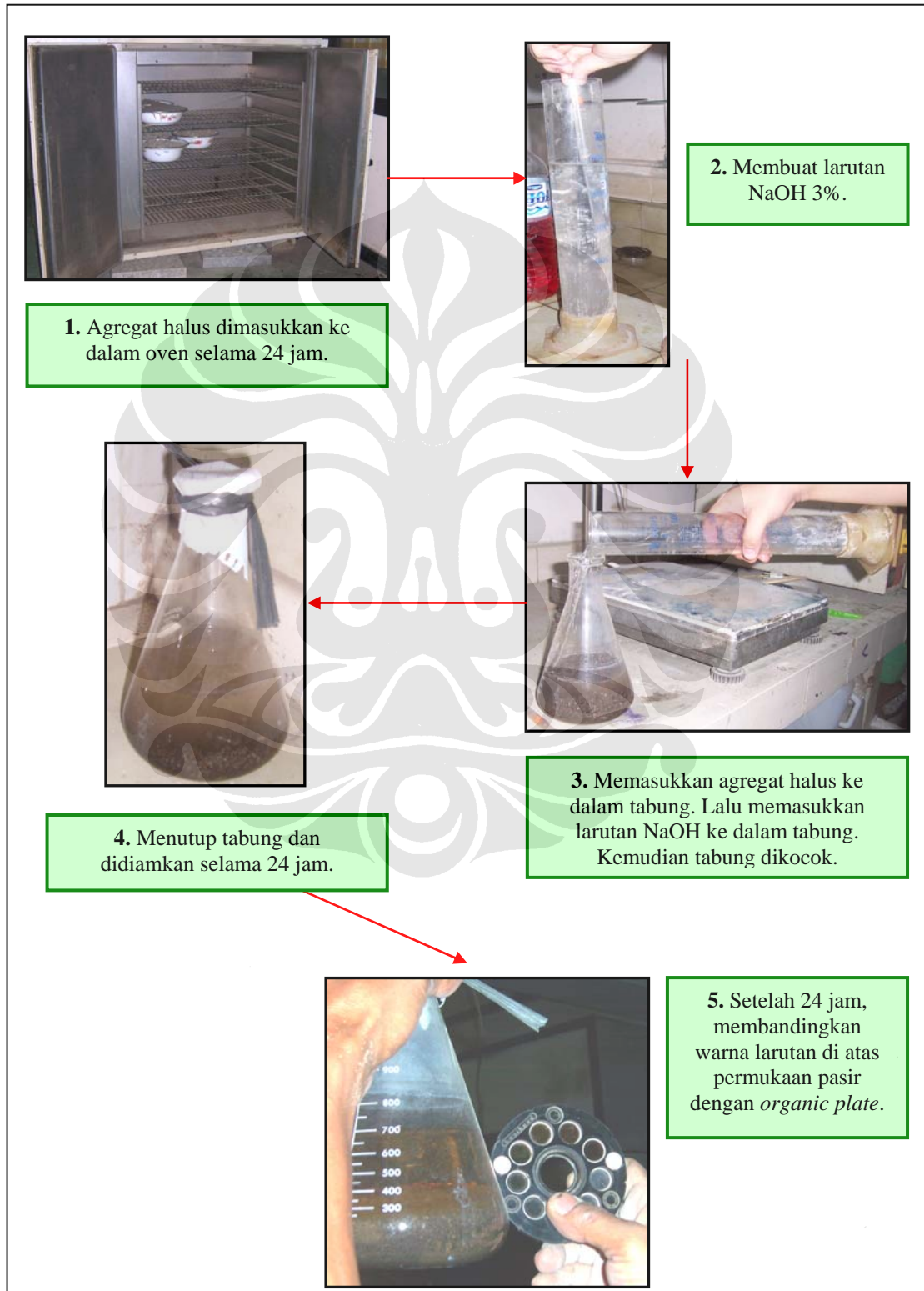
LAMPIRAN A-4

Proses pemeriksaan bahan lewat saringan No. 200 (ASTM C – 177)



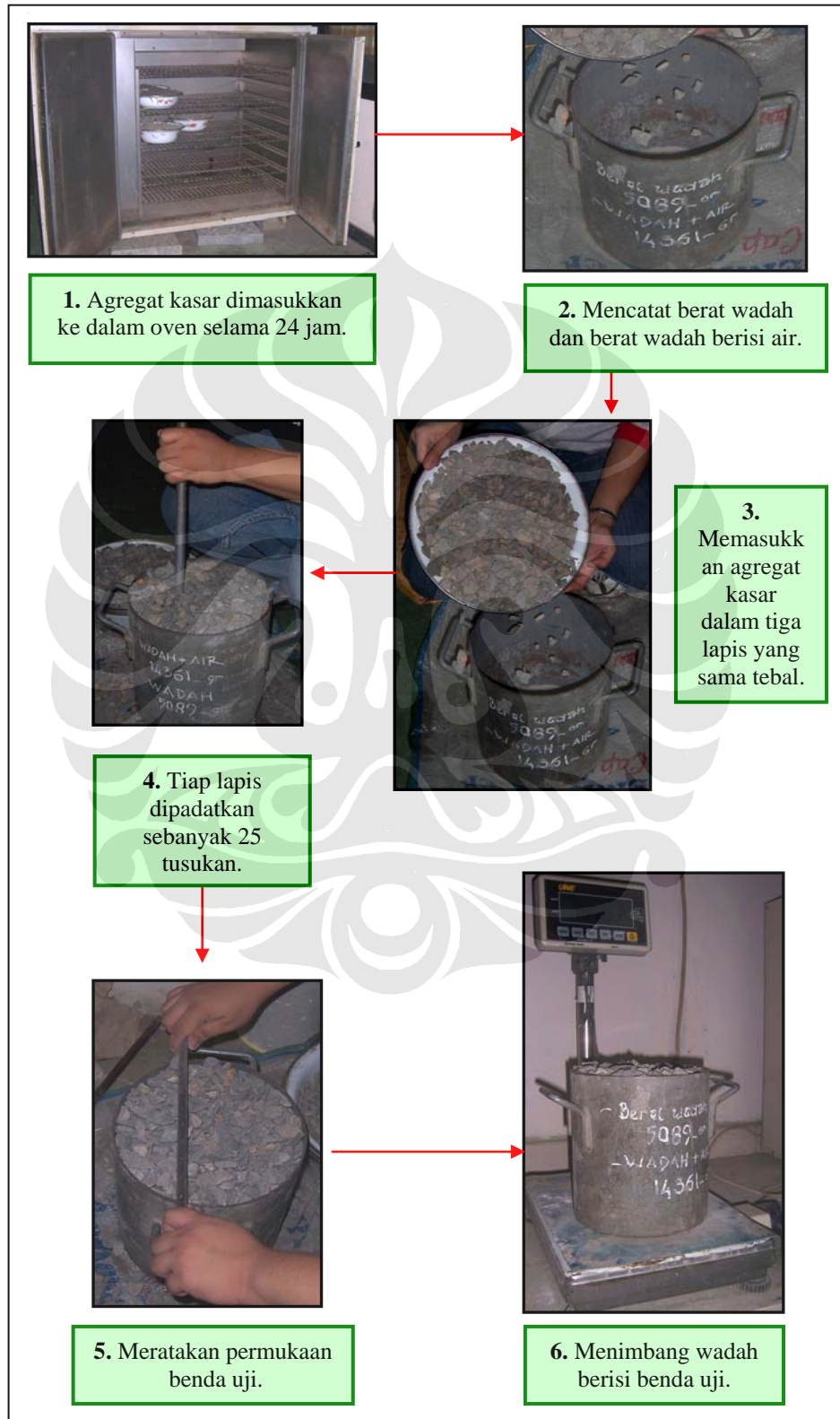
LAMPIRAN A-5

Proses pemeriksaan kotoran organik dalam agregat halus (ASTM C – 40)



LAMPIRAN A-6

Proses pemeriksaan berat isi agregat kasar dengan metode penusukan (ASTM C - 29)



LAMPIRAN A-7

Proses analisa saringan agregat (ASTM C – 136)



1. Agregat kasar dimasukkan ke dalam oven selama 24 jam.



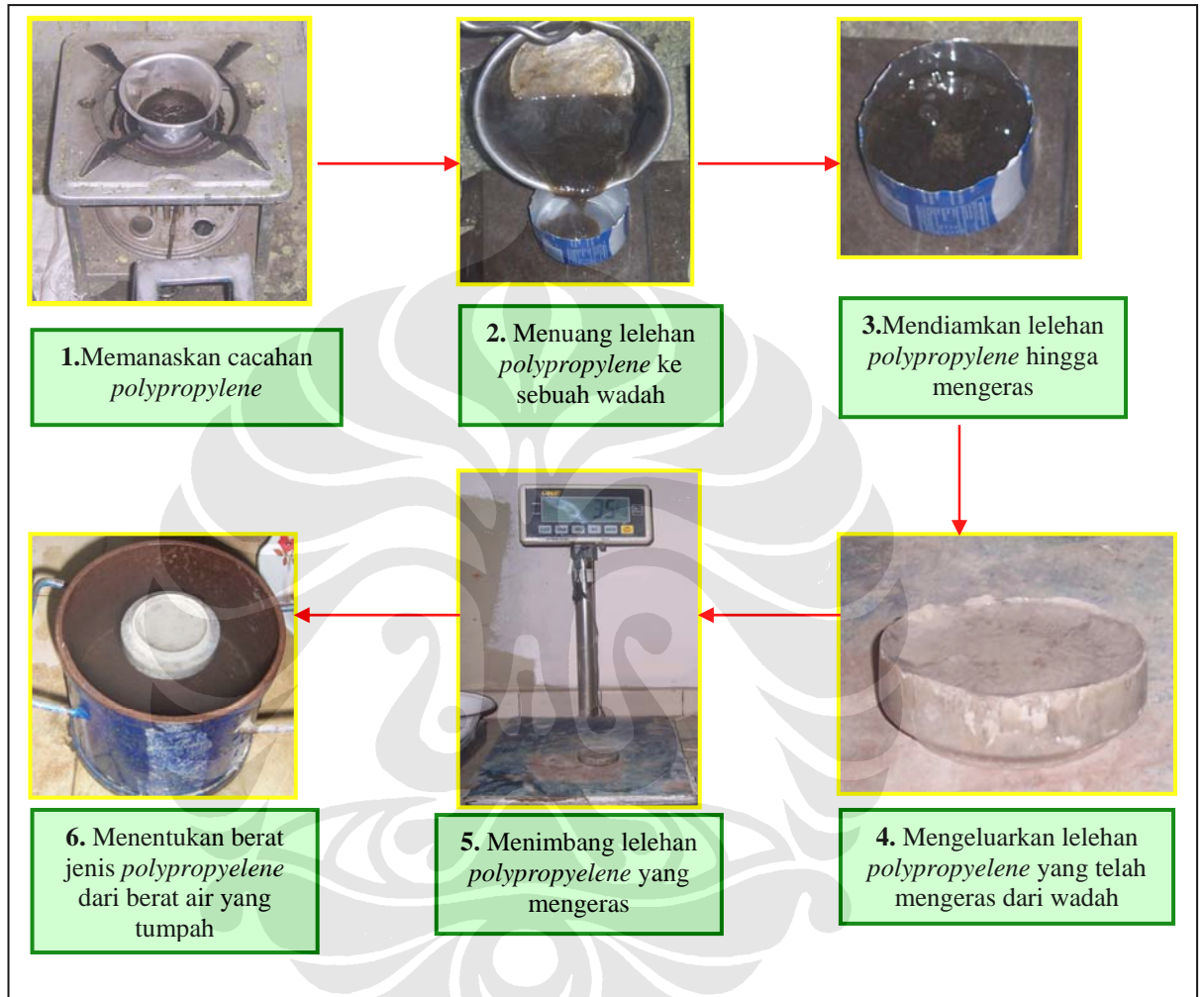
2. Menyusun saringan. Memasukkan agregat kasar ke dalam saringan yang telah disusun. Diguncang dengan mesin pengguncang selama 15 menit.



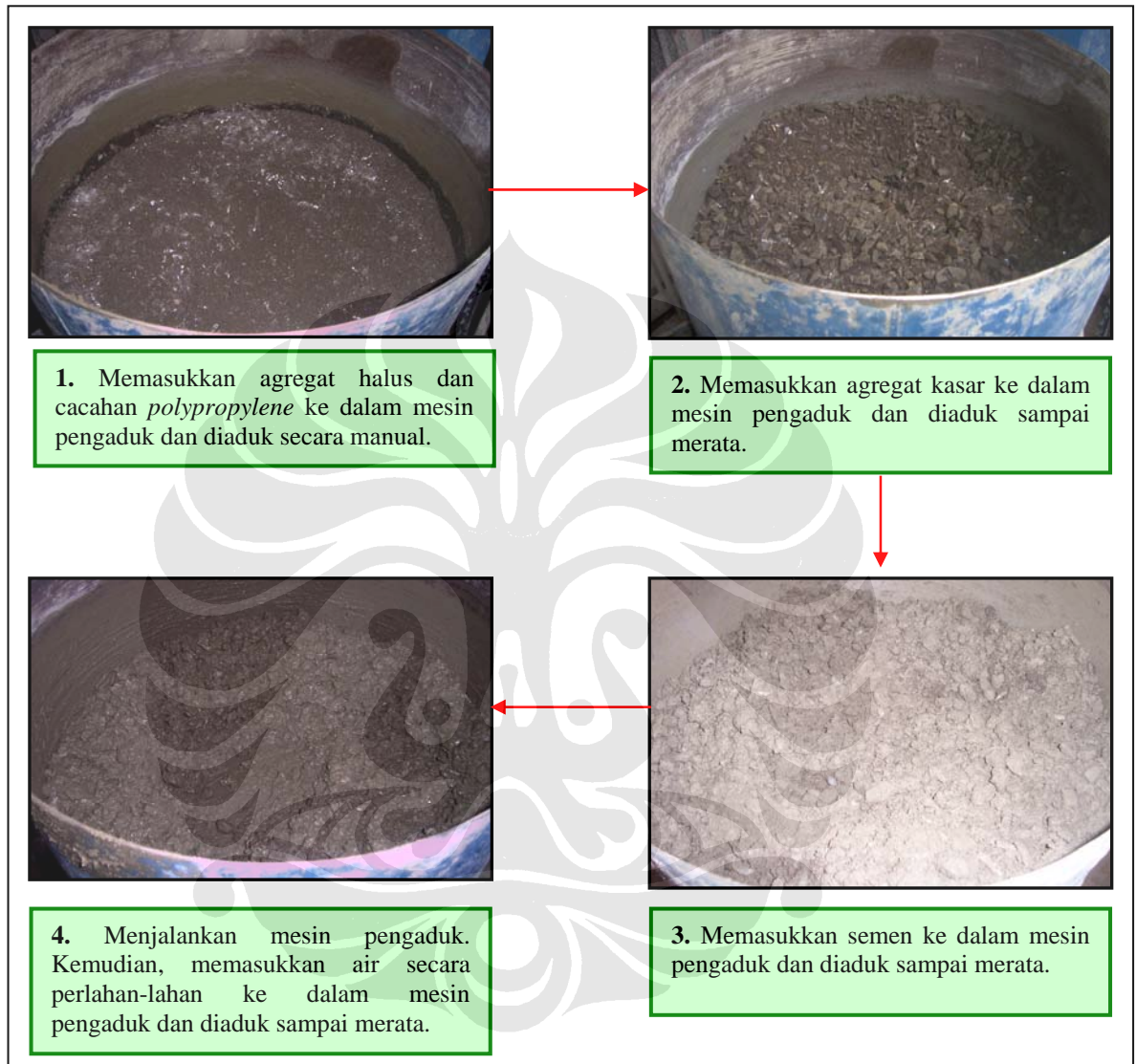
3. Menimbang agregat yang tertahan dalam tiap saringan.

LAMPIRAN A-8

Proses pemeriksaan berat jenis *polypropylene*

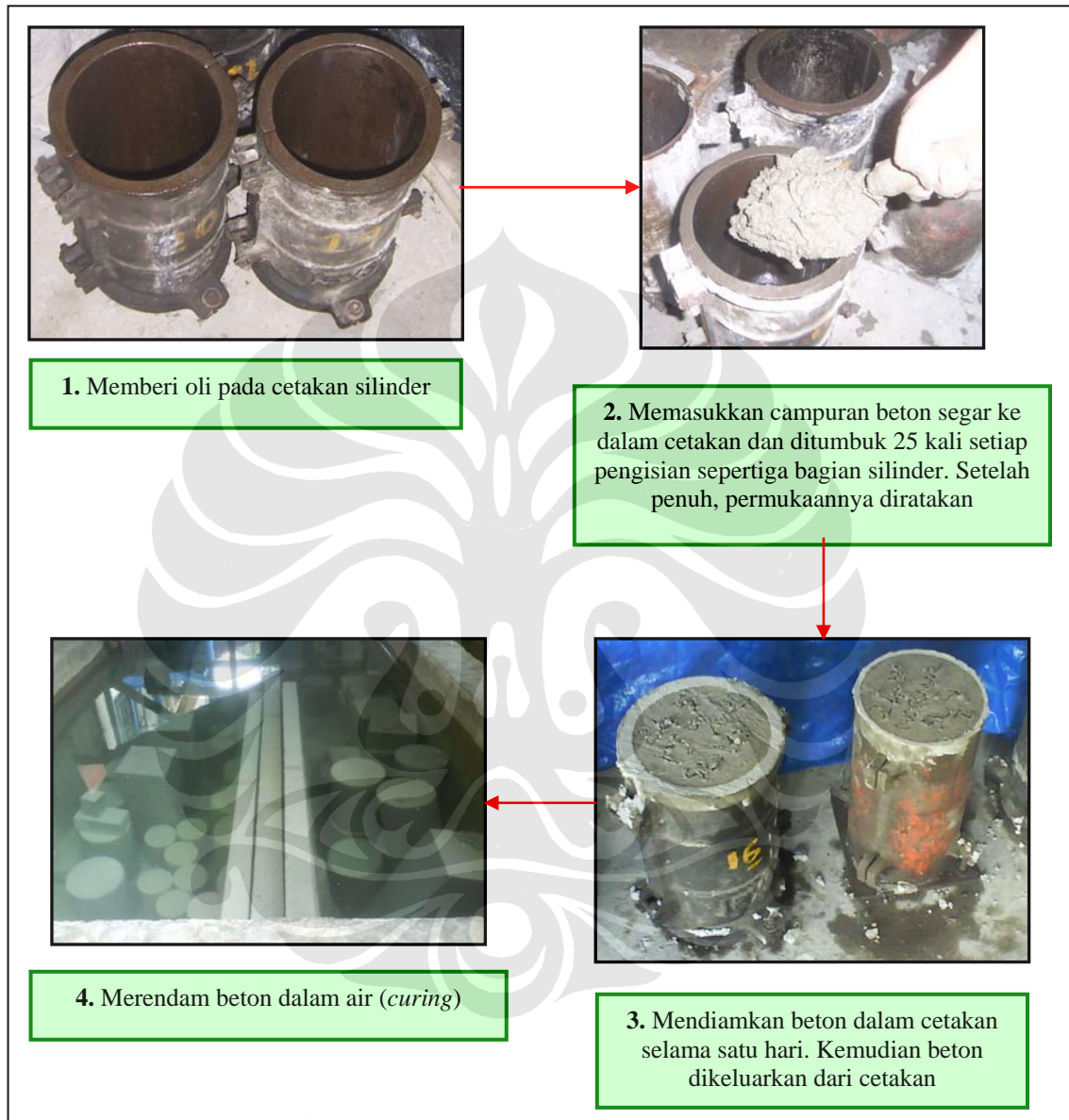


LAMPIRAN A-9
Proses pengecoran



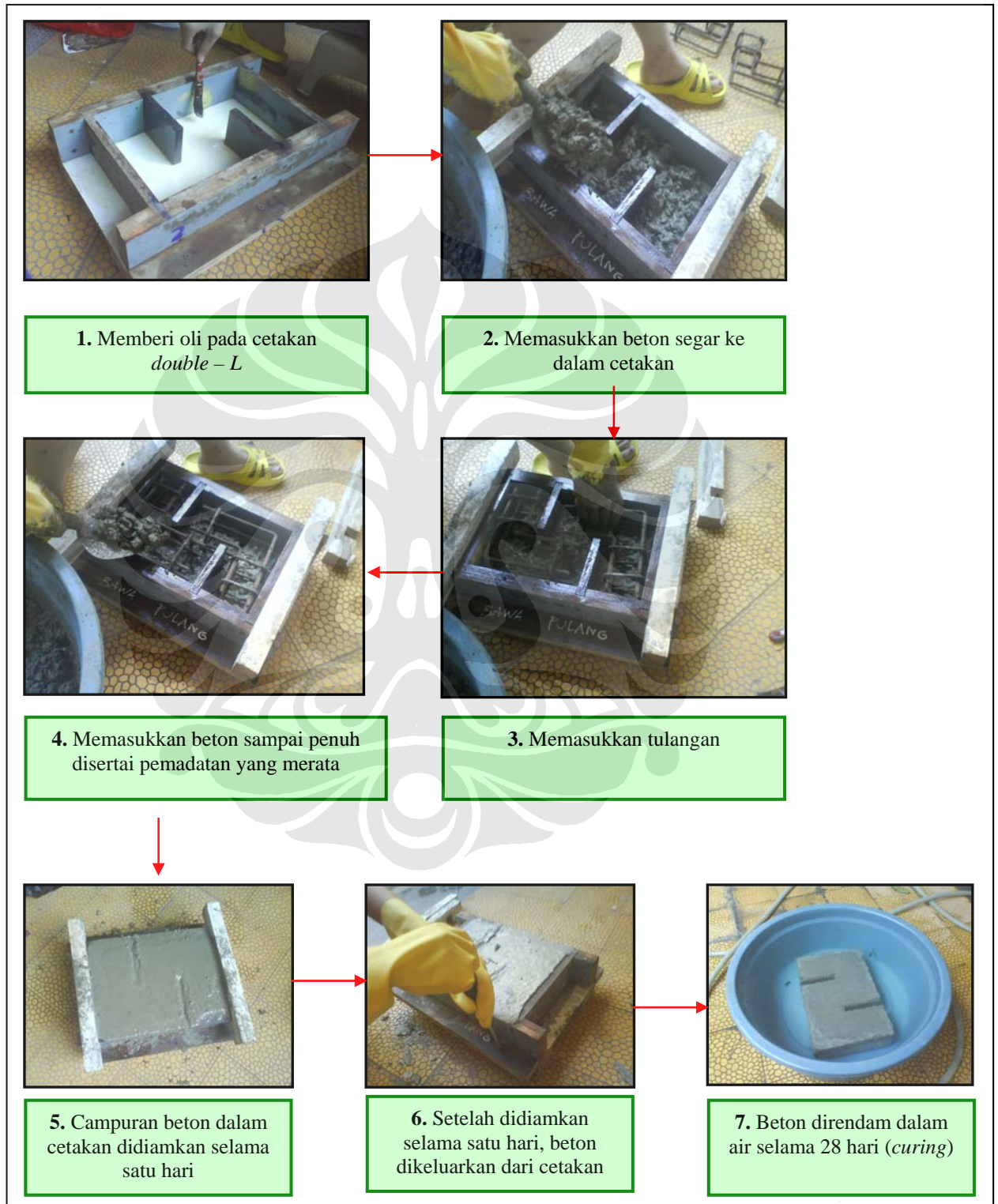
LAMPIRAN A-10

Proses pencetakan benda uji silinder (ASTM C – 192)



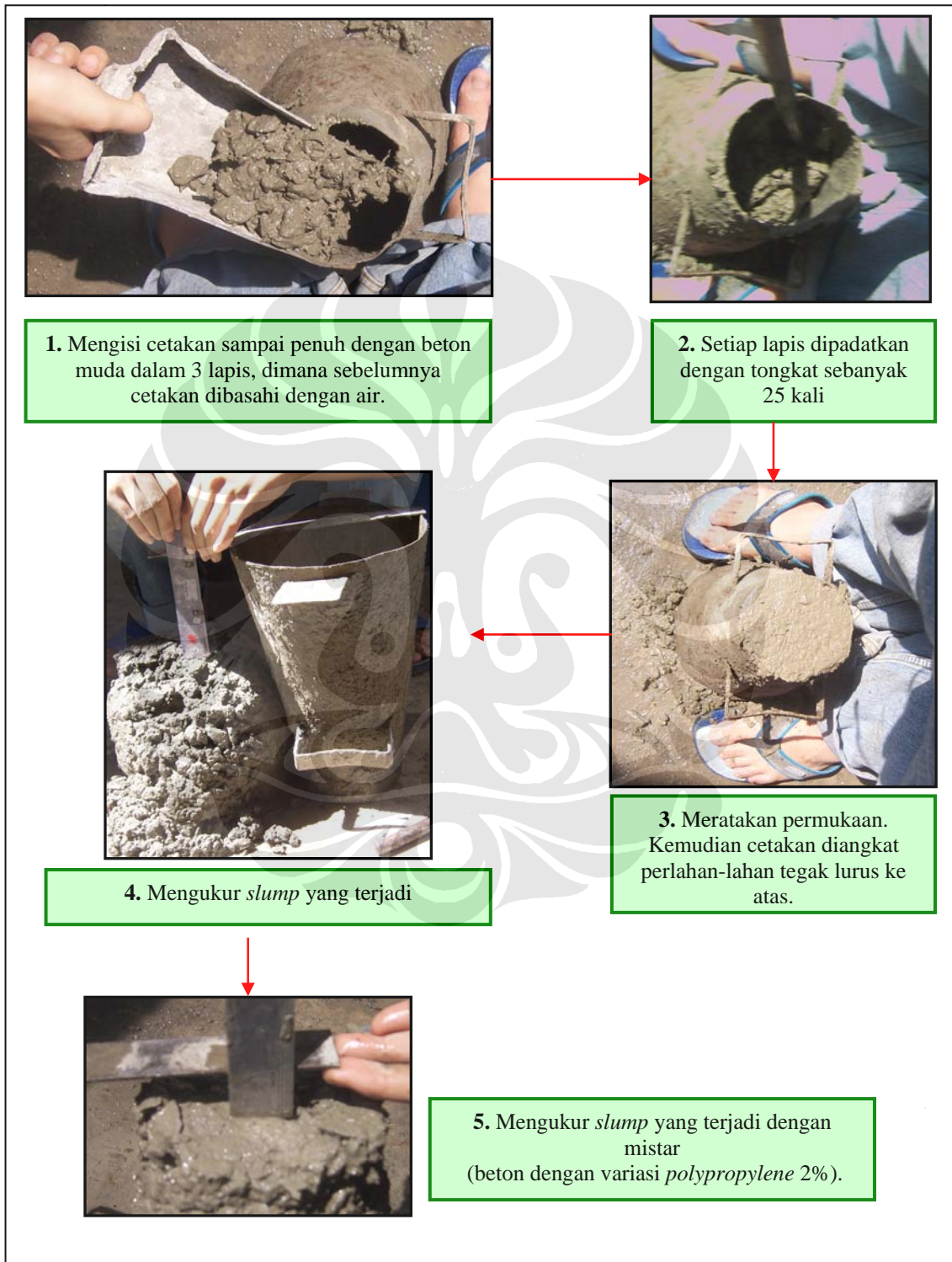
LAMPIRAN A-11

Proses pencetakan benda uji *double - L* (ASTM C - 192)



LAMPIRAN A-12

Proses pengujian *slump* beton (ASTM C – 143)



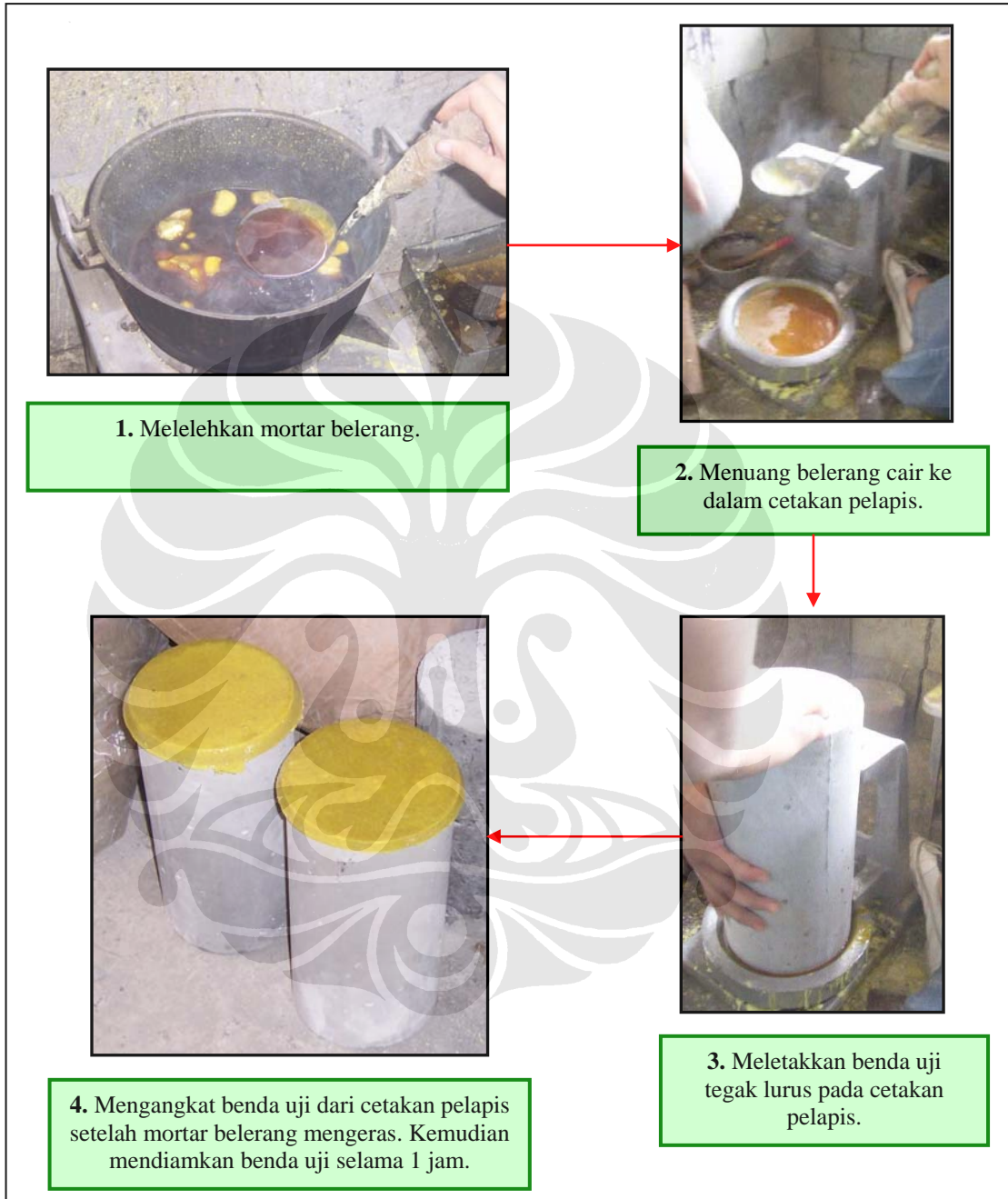
LAMPIRAN A-13

Proses pengujian kuat tekan beton (ASTM C – 39)

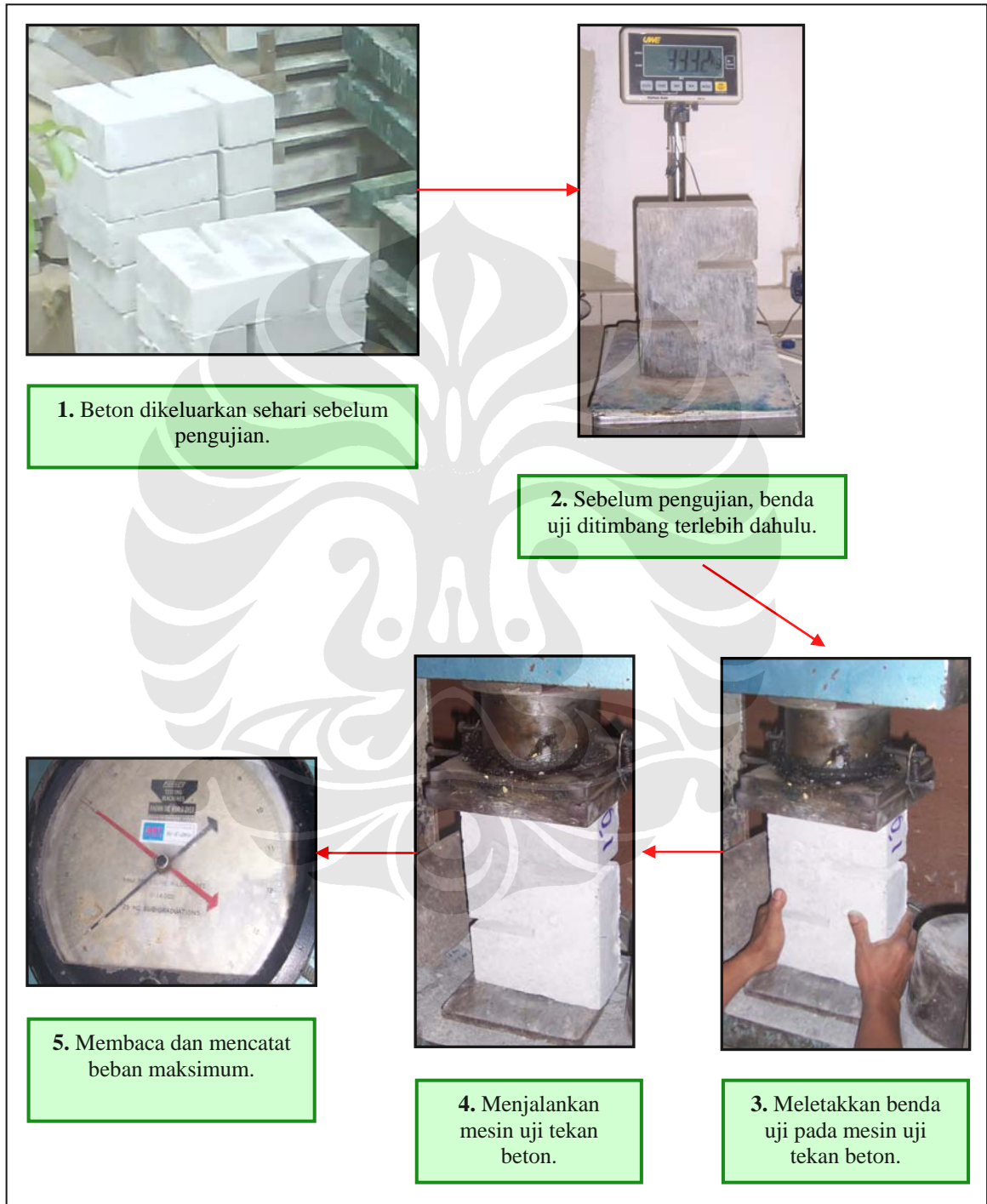


LAMPIRAN A-14

Proses meratakan permukaan benda uji silinder dengan mortar belerang (ASTM C – 617)



LAMPIRAN A-15
Proses pengujian kuat geser beton



LAMPIRAN A-16

Proses pengujian modulus elastisitas beton (ASTM C – 469)



1. Setelah benda uji di-capping dan ditimbang, dipasang alat pembaca regangan vertikal.



2. Memasang alat pembaca regangan horizontal. Setelah alat terpasang, mengukur besarnya konversi untuk deformasi vertikal dan horizontal.



3. Meletakkan benda uji pada mesin uji tekan dan membaca dial untuk deformasi vertikal & horizontal dengan kekuatan 40% P_{maks} . Kemudian timbang benda uji dan menentukan P_{maks} .

LAMPIRAN A-17

Hasil uji *slump* beton untuk setiap variasi kadar cacahan *polypropylene*



LAMPIRAN B
PERHITUNGAN RANCANG CAMPUR BETON
Metode U.S. Bureau of Reclamation

Kriteria Desain :

- f_c' = 25MPa .
- *Slump* = 12 cm.
- MSA = 20 mm.
- *Sand* (Agregat Halus)
 - *Specific Gravity* = 2,545 ton/m³
 - *Fines Modulus* = 2,177175
- *Coarse Aggregate* (Agregat Kasar)
 - *Specific Gravity* = 2,579 ton/m³
- *Semen*
 - *Specific Gravity* = 3,150 ton/m³

Rancangan campuran beton sesuai dengan standar U.S. Bureau of Reclamation:

1. Menentukan *target strength* (δ_{ts})

$$\delta_{ts} = \frac{\delta_{ds}}{1-t.v} = \frac{250}{1-(0,883)(0,15)} = 288,168 \text{ kg/cm}^2$$

Di mana :

δ_{ts} = *target strength*

δ_{ds} = *standard design strength*

t = konstanta

v = *coefficient of variation*

2. Berdasarkan ukuran agregat maksimum dari tabel, dapat ditentukan berat satuan air (W) dan presentase pasir terhadap agregat (S/A).

Entrapped Air (A) = 2 %.
 S/A = 45 %.
 W = 185 kg.

Ukuran agregat maksimum yang dianjurkan dipakai dalam bermacam-macam tipe konstruksi

Max size of aggregate (mm)	Unit Coarse Aggregate Content by Volume (%)	Concrete Without AE ad				Air Entrained Aggregate			
		Entrapped Air	Sand Percent	Water Content	Air Content	With good quality AE admixture		With good quality water reducing ad	
		(%)	S/A (%)	W (kg)	(%)	S/A (%)	W (kg)	S/A (%)	W (kg)
15	53	2.5	49	190	7	46	170	47	160
20	61	2	45	185	6	42	165	43	155
25	66	1.5	41	175	5	37	155	33	145
40	72	1.2	36	165	4.5	33	145	34	135
50	75	1	33	155	4	30	135	31	125
80	91	0.5	31	140	3.5	28	120	29	110

Catatan :

- Harga-harga di atas berlaku untuk beton yang menggunakan pasir alam dengan FM = 2,8 dan slump beton dalam mixer 8 cm
- Penyesuaian harga-harga di atas untuk kondisi yang lain adalah dengan menggunakan tabel 4.

Tabel penyesuaian untuk S/A dan W

Change in material proportion		Correction on S/A and W	
		S/A (%)	W (%)
1	Each 0.1 increase or decrease in FM of sand	±0.5	No correction
2	Each 1 cm increase or decrease in slump	No correction	±1.2%
3	Each 1% increase or decrease in air content	±0.5-1	±3%
4	Using crushed coarse aggregate	±3-5	±9-15
5	Using crushed coarse sand	±2-3	±6-9
6	Each 0.05 increase or decrease in water-cement ratio	±4	No correction
7	Each 1% increase or decrease in S/A	No correction	±1.5

Dengan menggunakan tabel, maka diperlukan penyesuaian perhitungan yang disajikan pada tabel di bawah ini :

Perhitungan S/A dan W dengan penyesuaian

Penyesuaian	S/A = 45%	W= 185kg
FM = 2.177175	$45 - \left\{ \frac{(2,8 - 2,177)}{0,1} \right\} (0,5) = 44,222$	No correction
Slump = 12cm	No correction	$185 + \{(12 - 8)(1,2\%)(185)\} = 193,880$
Crushstone	$44,2215 + 4\% = 48,222\%$	$193,88 + 12 = 205,880$
S/A	No correction	$205,88 + (48,2215 - 45)(1,5) = 210,712$

3. Menentukan berat satuan semen (C) dari berat satuan air (W) dan *water-cement ratio* (W/C).

Menentukan W/C dari Tabel

Harga *compressive strength* minimum rata-rata dari beton untuk bermacam-macam harga *water-cement ratio*

W/C	Compressive Strength pada Umur 28 hari (kg/cm ²)	
	Beton dengan AE saja	Beton dengan AE +WRA
0.4	400	450
0.45	340	390
0.5	290	340
0.55	250	290
0.6	220	250
0.65	180	220
0.7	150	190

Dengan interpolasi, diperoleh W/C = 0,50229

Maka nilai C dapat ditentukan :

$$C = \frac{W}{0,50229} = \frac{210,712\text{kg}}{0,50229} = 419,500\text{kg}$$

4. Menentukan volume total agregat

$$V_{\text{agregat}} = 1 - \left(\frac{C}{SG_C} + \frac{W}{1000} + A \right)$$

$$V_{\text{agregat}} = 1 - \left(\frac{419,500}{3150} + \frac{210,712}{1000} + \frac{2}{100} \right) = 0,636 \text{ m}^3$$

5. Menentukan jumlah agregat halus dan agregat kasar

$$S / A = 48,2215\%$$

$$\begin{aligned} S &= (S/A)(V_{\text{agregat}})(SG_S) \\ &= \left(\frac{48,222}{100} \right) (0,636) (2545) \\ &= 780,660 \text{ kg} \end{aligned}$$

$$\begin{aligned} CA &= (100 - S/A)(V_{\text{agregat}})(SG_{CA}) \\ &= \left(\frac{100 - 48,222}{100} \right) (0,636) (2579) \\ &= 849,443 \text{ kg} \end{aligned}$$

6. Kesimpulan

Untuk 1 m^3 beton dibutuhkan:

- Agregat halus (S) = 780,660 kg
- Agregat kasar (Ca) = 849,443 kg
- Semen (C) = 419,500 kg
- Air (W) = 210,712 kg

7. Jumlah benda uji

- Silinder $\phi 15 \times 30 \text{ cm}$ = 54 buah.
- Balok *Double L* ($30 \times 20 \times 7,5 \text{ cm}^3$) = 21 buah.

Volume benda uji yang dibutuhkan

- Silinder $\phi 15 \times 30 \text{ cm}$ = $54 \times \frac{1}{4} \times \pi \times 15^2 \times 30 = 0,286 \text{ m}^3$
 - Balok *Double L* = $21 \times 30 \times 20 \times 7,5 = 0,095 \text{ m}^3$ +
- | | | |
|-------|---------|--------------|
| Total | = 0,381 | m^3 |
|-------|---------|--------------|

8. Jumlah bahan dan material yang diperlukan

Agar campuran tidak kurang atau terlalu pas ketika dimasukkan ke dalam *mould* maka kebutuhan bahan campuran ditambah sebesar 15%

- Agregat halus

$$S = 115\% \times 780,660 \text{ kg} \times 0,381 = 341,867 \text{ kg.}$$

- Agregat kasar

$$Ca = 115\% \times 849,443 \text{ kg} \times 0,381 = 371,988 \text{ kg.}$$

- Semen

$$C = 115\% \times 419,500 \text{ kg} \times 0,381 = 183,707 \text{ kg.}$$

- Air

$$W = 115\% \times 210,712 \text{ kg} \times 0,381 = 92,275 \text{ kg.}$$

Hasil perhitungan rancang campur dengan Metode U.S Bureau Of Reclamation dirangkum pada table di bawah ini :

Semen	Agregat Halus	Agregat Kasar	Air
419,500 kg	780,660 kg	849,443 kg	210,712 kg



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Departemen Sipil - Fakultas Teknik

Universitas Indonesia

Kampus Baru UI Depok, Telp. 7874878 – 7270029 (Ext. 18) – 7270028 (Fax)

**TEST FOR UNIT WEIGHT IN FINE AGGREGATE
(ASTM C – 29)**

Sample : agregat halus
Size : 0,074 – 4,75 mm
Source : Sukabumi

Date Tested : 18 Juni 2008

		Metode	
		Berat isi lepas	Penusukan
a) Weight of Measure	(kg)	1,055	1,055
b) Weight of Measure + Water	(kg)	3,055	3,055
c) Weight of Measure and Sample	(kg)	3,892	4,148
d) Weight of Sample	(kg)	2,837	3,093
e) Volume of Measure	(liter)	2,000	2,000
f) Unit weight of aggregate	(kg/liter)	1,419	1,547
B) Bulk Specific of Aggregate	(kg/liter)	2,446	
W) Unit Weight of Water	(kg/liter)	1	
Void	(%)	41,975	36,741
$d = c - a$ $e = b - a$		$f = \frac{d}{e}$ $\text{void}(\%) = \frac{(B \times W) - f}{(B \times W)} \times 100\%$	

Jakarta, 18 Juni 2008
Head of Laboratory,

Dr. Ir. Elly Tjahjono, DEA



LABORATORIUM STRUKTUR DAN MATERIAL
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**TEST FOR SPECIFIC GRAVITY
AND ABSORPTION – TEST OF FINE AGGREGATE
(ASTM C – 128)**

Sample : agregat halus
Size : 0,074 – 4,75 mm
Source : Sukabumi

Date Tested : 3 Maret 2008

A) Weight of Oven-Dry Specimen in Air	(gram)	477	484
B) Weight of Pycnometer Filled with Water	(gram)	668	670
C) Weight of Pycnometer with Specimen and Water to Calibration Mark	(gram)	970	975
Bulk Specific Gravity	$= \frac{A}{B + 500 - C}$	2,409	2,482
Average of Above		2,446	
Bulk Specific Gravity	$= \frac{500}{B + 500 - C}$	2,525	2,564
(Saturated-Surface-Dry Basis)			
Average of Above		2,545	
Apparent Specific Gravity	$= \frac{A}{B + A - C}$	2,726	2,704
Average of Above		2,715	
Absorption (%)	$= \frac{500 - A}{A} \times 100\%$	4,822	3,306
Average of Above	(%)	4,064	

Jakarta, 3 Maret 2008
Head of Laboratory,

Dr. Ir. Elly Tjahjono, DEA



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**SIEVE ANALYSIS OF FINE AGGREGATE
 (ASTM C – 136)**

SAMPLE : agregat halus DATE TESTED : 3 Maret 2008
 SIZE : 0,074 – 4,75 mm
 SOURCE : Sukabumi

SIEVE SIZE		SAMPLE No. 1			SAMPLE No. 2			AVERAGE	
		WEIGHT RET (kg)	IND % RET	CUM % RET	WEIGHT RET (kg)	IND % RET	CUM % RET	IND %	CUM %
No. 4	4,75	0,002	0,397	0,397	0,002	0,407	0,407	0,402	0,402
No. 8	2,36	0,004	0,794	1,190	0,005	1,018	1,426	0,906	1,308
No. 16	1,18	0,065	12,897	14,087	0,065	13,238	14,664	13,068	14,376
No. 30	0,60	0,119	23,611	37,698	0,121	24,644	39,308	24,127	38,503
No. 50	0,30	0,167	33,135	70,833	0,165	33,605	72,912	33,370	71,873
No. 100	0,150	0,105	20,833	91,667	0,092	18,737	91,650	19,785	91,658
No. 200	0,074	0,028	5,556	97,222	0,027	5,499	97,149	5,527	97,185
PAN	PAN	0,014	2,778	100,000	0,014	2,851	100,000	2,815	100,000
TOTAL		0,504	100,000		0,491	100,000		100,000	
F.M.			2,155			2,200		2,177	





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**TEST FOR MATERIALS FINER THAN NO. 200 SIEVE
IN MINERAL AGGREGATE BY WASHING
(ASTM C – 177)**

Sample : agregat halus
Size : 0,074 – 4,75 mm
Source : Sukabumi
Date Tested : 18 Juni 2008

		I
B) Original dry weight of sample	(gr)	500
C) Dry weight of sample, after washing	(gr)	476
A) Percentage of material finer than No. 200 sieve, by washing	(%)	4,800
$A = \frac{B - C}{B} \times 100\%$		

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**TEST FOR ORGANIC IMPURITIES IN FINE AGGREGATE
(ASTM C – 40)**

Sample : agregat halus
Size : 0,074 – 4,75 mm
Source : Sukabumi
Date Tested : 18 Juni 2008

Nearest Colour of the liquid of the test sample	Organic plate Number
Lighter / Equal / Darker Colour to	1
	②
	3 (Standard)
	4
	5

Determination of Colour Value :

Lighter / Equal / Darker Colour to that the reference standard (No.3)

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TEST FOR UNIT WEIGHT IN COARSE AGGREGATE
(ASTM C – 29)

Sample : agregat kasar
Size : maksimum 20 mm
Source : Sukabumi

Date Tested : 18 Juni 2008

		Metode Penusukan
a) Weight of Measure	(kg)	5,089
b) Weight of Measure + Water	(kg)	14,361
c) Weight of Measure and Sample	(kg)	18,561
d) Weight of Sample	(kg)	13,472
e) Volume of Measure	(liter)	9,272
f) Unit weight of aggregate	(kg/liter)	1,453
B) Bulk Specific Gravity of Aggregate	(kg/liter)	2,492545
W) Unit Weight of Water	(kg/liter)	1
Void	(%)	41,71
$d = c - a$ $e = b - a$ $f = \frac{d}{e}$		$\text{void}(\%) = \frac{(B \times W) - f}{(B \times W)} \times 100\%$

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**TEST FOR SPECIFIC GRAVITY
AND ABSORPTION – TEST OF COARSE AGGREGATE
(ASTM C – 127)**

Sample : agregat kasar
Size : maksimum 20 mm
Source : Sukabumi

Date Tested : 3 Maret 2008

A) Weight of Oven-Dry Specimen in Air	(gram)	4838	4828
B) Weight SSD Specimen in Air	(gram)	5000	5000
C) Weight of Saturated Specimen in Water	(gram)	3066	3056
Bulk Specific Gravity	$= \frac{A}{B - C}$	2,5015 5	2,483 54
Average of Above		2,492545	
SSD Specific Gravity	$= \frac{B}{B - C}$	2,585	2,572
Average of Above		2,579	
Apparent Specific Gravity	$= \frac{A}{A - C}$	2,730	2,725
Average of Above		2,7275	
Absorption (%)	$= \frac{B - A}{A} \times 100\%$	3,348	3,562
Average of Above	(%)	3,455	

Jakarta, 3 Maret 2008
Head of Laboratory,

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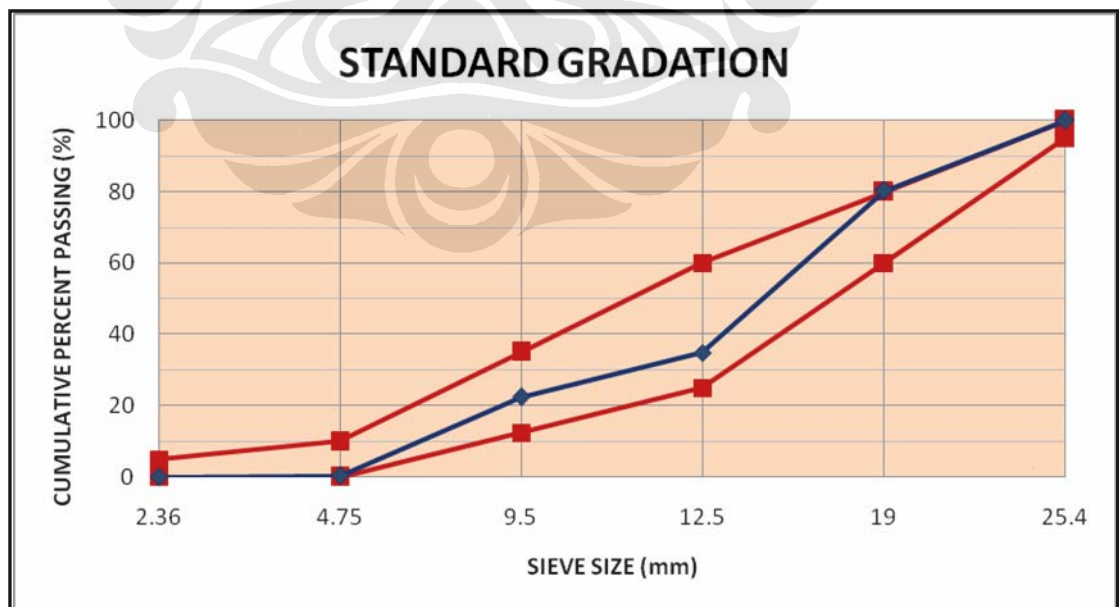


**SIEVE ANALYSIS OF COARSE AGGREGATE
 (ASTM C – 136)**

Sample : agregat kasar
 Size : maksimum 20 mm
 Source : Sukabumi

Date Tested : 18 Juni 2008

SIEVE SIZE		SAMPLE No. 1			SAMPLE No. 2			AVERAGE	
		WEIGHT RET (kg)	IND % RET	CUM % RET	WEIGHT RET (kg)	IND % RET	CUM % RET	IND %	CUM %
No.	(mm)								
No. 3/4	19,1	1138	22.81018	22.81018	823	16.50291	16.50291	19.6565	19.6565
No. 1/2	12,5	2235	44.79856	67.60874	2295	46.01965	62.52256	45.4091	65.0656
No. 3/8	9,5	583	11.68571	79.29445	655	13.13415	75.65671	12.4099	77.4756
No. 4	4,75	1006	20.16436	99.45881	1194	23.94225	99.59896	22.0533	99.5289
PAN	PAN	27	0.541191	100	20	0.401043	100	0.47112	100
TOTAL		4989	100		4987	100			





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TEST FOR UNIT WEIGHT OF *POLYPROPYLENE*

Sample : *polypropylene*

Size : 3 – 25 mm

Date Tested : 3 Maret 2008

a) Berat Wadah	(g)	155
b) Berat Wadah + Air yang Tumpah	(g)	194
c) Berat Sampel	(g)	35
d) Volume	(cm ³)	39
e) Berat Jenis Air	(g/cm ³)	1
f) Berat Jenis <i>Polypropylene</i>	(g/cm ³)	0,897
$d = b - a$		
$f = \frac{c}{d}$		

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DATA TES TEKAN BETON UMUR 7 HARI

No.	Kode	Variasi (%)	Tanggal Cor	Tanggal Tes	Umur (hari)	Berat (g)	Slump (cm)	Luas Bidang Tekan (cm ²)	Beban Maks (kg)	$\sigma'b$ (kg/cm ²)	$\sigma'b$ 28 hari (kg/cm ²)
1	T7-0-1	0,00	5-Mar-2008	12-Mar-2008	7	12259	12	176,7857143	35000	197,9798	282,82828
2	T7-0-2	0,00	5-Mar-2008	12-Mar-2008	7	12224	12	176,7857143	37500	212,1212	303,0303
3	T7-0-3	0,00	5-Mar-2008	12-Mar-2008	7	12216	12	176,7857143	37500	212,1212	303,0303
4	T7-0,1-1	0,10	12-Mar-2008	19-Mar-2008	7	12265	12	176,7857143	37000	209,2929	298,9899
5	T7-0,1-2	0,10	12-Mar-2008	19-Mar-2008	7	12070	12	176,7857143	38750	219,1919	313,13131
6	T7-0,1-3	0,10	12-Mar-2008	19-Mar-2008	7	12149	12	176,7857143	37750	213,5354	305,05051
7	T7-0,2-1	0,20	3-Apr-2008	10-Apr-2008	7	12226	12	176,7857143	38000	214,9495	307,07071
8	T7-0,2-2	0,20	3-Apr-2008	10-Apr-2008	7	12206	12	176,7857143	36250	205,0505	292,92929
9	T7-0,2-3	0,20	3-Apr-2008	10-Apr-2008	7	12244	12	176,7857143	40000	226,2626	323,23232
10	T7-0,3-1	0,30	3-Apr-2008	10-Apr-2008	7	12121	12	176,7857143	40000	226,2626	323,23232
11	T7-0,3-2	0,30	3-Apr-2008	10-Apr-2008	7	12325	12	176,7857143	37500	212,1212	303,0303
12	T7-0,3-3	0,30	3-Apr-2008	10-Apr-2008	7	12215	12	176,7857143	34000	192,3232	274,74747
13	T7-0,5-1	0,50	16-Apr-2008	23-Apr-2008	7	12237	11	176,7857143	45000	254,5455	363,63636
14	T7-0,5-2	0,50	16-Apr-2008	23-Apr-2008	7	12357	11	176,7857143	24500	138,5859	197,9798
15	T7-0,5-3	0,50	16-Apr-2008	23-Apr-2008	7	12296	11	176,7857143	43500	246,0606	351,51515
16	T7-0,7-1	0,70	22-Apr-2008	29-Apr-2008	7	12087	10	176,7857143	33000	186,6667	266,66667
17	T7-0,7-2	0,70	22-Apr-2008	29-Apr-2008	7	12012	10	176,7857143	30000	169,697	242,42424
18	T7-0,7-3	0,70	22-Apr-2008	29-Apr-2008	7	12080	10	176,7857143	33000	186,6667	266,66667
19	T7-1-1	1,00	21-Apr-2008	28-Apr-2008	7	12033	8	176,7857143	38000	214,9495	307,07071
20	T7-1-2	1,00	21-Apr-2008	28-Apr-2008	7	12084	8	176,7857143	35000	197,9798	282,82828
21	T7-1-3	1,00	21-Apr-2008	28-Apr-2008	7	12179	8	176,7857143	42500	240,404	343,43434
22	T7-2-1	2,00	22-May-2008	29-May-2008	7	12024	3	176,7857143	36000	203,6364	301,0101
23	T7-2-2	2,00	22-May-2008	29-May-2008	7	11941	3	176,7857143	32500	183,8384	262,62626
24	T7-2-3	2,00	22-May-2008	29-May-2008	7	11967	3	176,7857143	38000	214,9495	244,44444
25	T7-3-1	3,00	15-May-2008	22-May-2008	7	12145	1	176,7857143	37250	210,7071	290,90909
26	T7-3-2	3,00	15-May-2008	22-May-2008	7	12264	1	176,7857143	32500	183,8384	262,62626
27	T7-3-3	3,00	15-May-2008	22-May-2008	7	11976	1	176,7857143	30250	171,1111	307,07071



LABORATORIUM STRUKTUR DAN MATERIAL

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DATA TES TEKAN BETON UMUR 28 HARI

No.	Kode	Variasi (%)	Tanggal Cor	Tanggal Tes	Umur (hari)	Berat (g)	Slump (cm)	Luas Bidang Tekan (cm ²)	Beban Maks (kg)	σ_b (kg/cm ²)
1	T28-0-1	0,00	10-Mar-2008	7-Apr-2008	28	12154	12	176,786	52500	296,970
2	T28-0-2	0,00	10-Mar-2008	7-Apr-2008	28	12216	12	176,786	49750	281,414
3	T28-0-3	0,00	10-Mar-2008	7-Apr-2008	28	12074	12	176,786	52500	296,970
4	T28-0,1-1	0,10	12-Mar-2008	9-Apr-2008	28	12362	12	176,786	46000	260,202
5	T28-0,1-2	0,10	12-Mar-2008	9-Apr-2008	28	12059	12	176,786	57500	325,253
6	T28-0,1-3	0,10	12-Mar-2008	9-Apr-2008	28	12185	12	176,786	49500	280,000
7	T28-0,2-1	0,20	26-Mar-2008	23-Apr-2008	28	12328	12	176,786	52750	298,384
8	T28-0,2-2	0,20	26-Mar-2008	23-Apr-2008	28	12308	12	176,786	50000	282,828
9	T28-0,2-3	0,20	26-Mar-2008	23-Apr-2008	28	12098	12	176,786	52000	294,141
10	T28-0,3-1	0,30	27-Mar-2008	24-Apr-2008	28	12203	12	176,786	54000	305,455
11	T28-0,3-2	0,30	27-Mar-2008	24-Apr-2008	28	12287	12	176,786	48250	272,929
12	T28-0,3-3	0,30	27-Mar-2008	24-Apr-2008	28	12281	12	176,786	49250	278,586
13	T28-0,5-1	0,50	16-Apr-2008	14-May-2008	28	12213	11	176,786	48500	274,343
14	T28-0,5-2	0,50	16-Apr-2008	14-May-2008	28	12442	11	176,786	48000	271,515
15	T28-0,5-3	0,50	16-Apr-2008	14-May-2008	28	12084	11	176,786	54500	308,283
16	T28-0,7-1	0,70	23-Apr-2008	21-May-2008	28	12244	10	176,786	49750	281,414
17	T28-0,7-2	0,70	23-Apr-2008	21-May-2008	28	12213	10	176,786	53500	302,626
18	T28-0,7-3	0,70	24-Apr-2008	19-Jun-2008	28	12059	10	176,786	50000	282,828
19	T28-1-1	1,00	21-Apr-2008	20-May-2008	28	12080	8	176,786	43000	243,232
20	T28-1-2	1,00	21-Apr-2008	20-May-2008	28	12077	8	176,786	41000	231,919
21	T28-1-3	1,00	21-Apr-2008	20-May-2008	28	12241	8	176,786	50250	284,242
22	T28-2-1	2,00	22-May-2008	7-Jun-2008	28	12071	3	176,786	43000	243,232
23	T28-2-2	2,00	22-May-2008	7-Jun-2008	28	12351	3	176,786	43000	243,232
24	T28-2-3	2,00	22-May-2008	7-Jun-2008	28	12094	3	176,786	40000	226,263
25	T28-3-1	3,00	15-May-2008	12-Jun-2008	28	12241	1	176,786	43750	247,475
26	T28-3-2	3,00	15-May-2008	12-Jun-2008	28	12134	1	176,786	50000	282,828
27	T28-3-3	3,00	15-May-2008	12-Jun-2008	28	12049	1	176,786	30500	172,525



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DATA TES GESER BETON UMUR 28 HARI

No.	Kode	Variasi (%)	Tanggal Cor	Umur (hari)	Berat (g)	Slump (cm)	Luas Bidang Tekan (cm ²)	Beban Maks (kg)	Kuat Geser (kg/cm ²)
1	G28-0-1	0,00	24-Apr-2008	28	11288	12	67,500	2250	33,333
2	G28-0-2	0,00	24-Apr-2008	28	11709	12	67,500	4000	59,259
3	G28-0-3	0,00	24-Apr-2008	28	11310	12	67,500	2250	33,333
4	G28-0,1-1	0,10	24-Apr-2008	28	11747	12	67,500	4200	62,222
5	G28-0,1-2	0,10	24-Apr-2008	28	11756	12	67,500	2075	30,741
6	G28-0,1-3	0,10	24-Apr-2008	28	11345	12	67,500	2750	40,741
7	G28-0,2-1	0,20	23-Apr-2008	28	11314	12	67,500	2400	35,556
8	G28-0,2-2	0,20	23-Apr-2008	28	11071	12	67,500	2525	37,407
9	G28-0,2-3	0,20	23-Apr-2008	28	11407	12	67,500	4100	60,741
10	G28-0,3-1	0,30	23-Apr-2008	28	11148	12	67,500	3925	58,148
11	G28-0,3-2	0,30	23-Apr-2008	28	11412	12	67,500	4475	66,296
12	G28-0,3-3	0,30	23-Apr-2008	28	11266	12	67,500	3700	54,815
13	G28-0,5-1	0,50	22-Apr-2008	28	11117	11	67,500	4000	59,259
14	G28-0,5-2	0,50	22-Apr-2008	28	11307	11	67,500	3950	58,519
15	G28-0,5-3	0,50	22-Apr-2008	28	10919	11	67,500	4175	61,852
16	G28-0,7-1	0,70	22-Apr-2008	28	11211	10	67,500	2900	42,963
17	G28-0,7-2	0,70	22-Apr-2008	28	11139	10	67,500	2700	40,000
18	G28-0,7-3	0,70	22-Apr-2008	28	11139	10	67,500	3200	47,407
19	G28-1-1	1,00	21-Apr-2008	28	11026	8	67,500	2900	42,963
20	G28-1-2	1,00	21-Apr-2008	28	10736	8	67,500	3625	53,704
21	G28-1-3	1,00	21-Apr-2008	28	11020	8	67,500	2250	33,333



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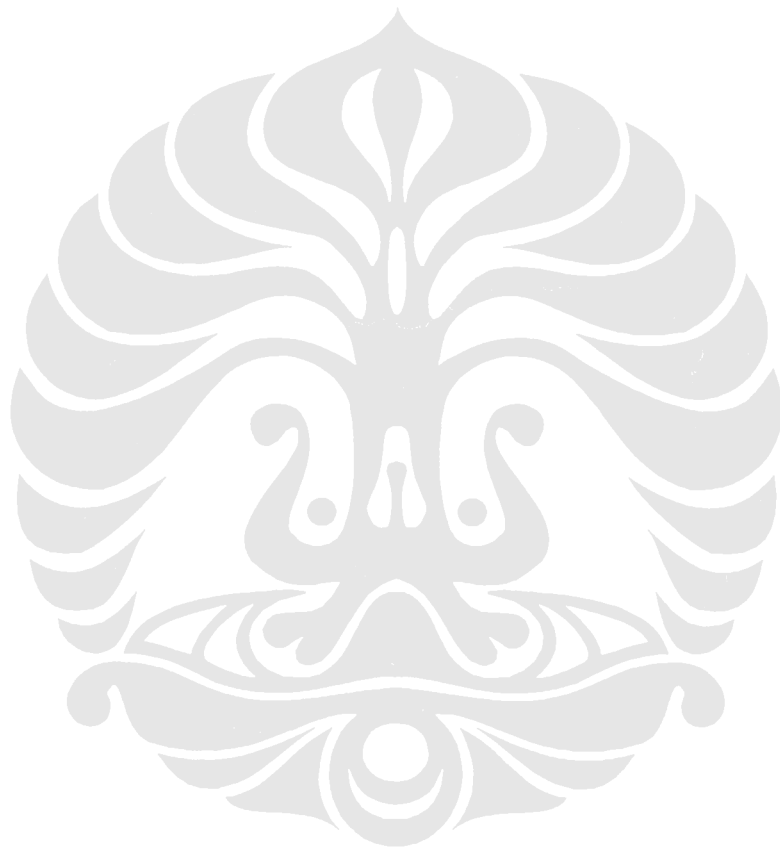
DATA MODULUS ELASTISITAS BETON
KODE : T28-0,7-3

P_{max} = 50000 kg.
 Koreksi Vertikal = 285 mm & 140 mm (dari as).
 Koreksi Horizontal = 280 mm & 95 mm (dari as).
 d = 150 mm.
 L = 200 mm.

P (kg)	Vertikal					
	Siklus 1		Siklus 2		Siklus 3	
	Naik (0,01 mm)	Turun (0,01 mm)	Naik (0,01 mm)	Turun (0,01 mm)	Naik (0,01 mm)	Turun (0,01 mm)
0	0,0	1,5	1,5	2,0	2,0	2,0
2500	1,0	6,0	3,0	5,0	2,5	6,0
5000	2,5	10,0	4,0	10,0	4,0	10,0
7500	4,0	14,0	5,5	13,0	6,0	14,0
10000	6,0	15,5	8,0	15,0	8,0	17,0
12500	8,0	15,5	9,0	17,0	10,0	17,0
15000	10,0	16,0	12,0	17,5	12,0	17,5
17500	12,0	16,0	14,0	17,5	14,0	17,5
20000	16,0	16,0	17,5	17,5	17,5	17,5

P (kg)	Horizontal					
	Siklus 1		Siklus 2		Siklus 3	
	Naik (0,01 mm)	Turun (0,01 mm)	Naik (0,01 mm)	Turun (0,01 mm)	Naik (0,01 mm)	Turun (0,01 mm)
0	0,0	1,0	1,0	1,0	1,0	1,0
2500	0,5	1,5	1,0	1,0	1,0	1,5
5000	0,5	2,5	1,0	1,0	1,0	2,5
7500	1,0	3,5	1,5	1,5	1,5	3,5
10000	1,5	4,0	2,0	2,0	2,0	4,0
12500	2,0	4,0	2,5	2,5	2,5	4,5
15000	2,5	4,0	3,0	3,0	3,0	4,5
17500	3,0	4,0	3,5	3,5	3,5	4,5
20000	4,0	4,0	4,5	4,5	4,5	4,5

LAMPIRAN D
Detail Cetakan benda Uji *Double - L*



LAMPIRAN E
ASTM Standard

