

BAB 5. KESIMPULAN DAN SARAN

A. Kesimpulan

Dari pembahasan dan hasil pengujian yang telah dipaparkan, dapat diambil kesimpulan sebagai berikut:

1. Nilai beban ultimit beton pada PB-1 adalah 82% dari PP, hal ini dikarenakan PP memiliki rongga di dalamnya walaupun keduanya memiliki tebal pelat yang sama. Sedangkan nilai beban ultimit beton PB-2 adalah 96% dari PP, namun keduanya memiliki volume yang sama. Nilai beban retak awal PP lebih besar dari PB-1, walaupun keduanya memiliki tebal yang sama. Namun pada PP dan PB-2, perbandingan nilai keduanya jauh berbeda dengan PB-2 yang memiliki nilai beban retak awal yang lebih besar dari PP.
2. Pola retak pada pelat pejal adalah pola retak lentur, dan pola retak pada pelat berongga adalah retak lentur (berdasarkan pengamatan).

B. Saran

Berdasarkan hasil eksperimen yang telah dilakukan maka dapat disarankan beberapa hal sebagai berikut:

1. Perlu dilakukan penelitian lebih lanjut mengenai pengaruh pelat beton berongga pada bangunan struktural.
2. Perlu diperhatikan setting time beton pada saat pengecoran untuk menjaga kualitas beton dan mengurangi terbentuknya rongga yang tidak diinginkan.

DAFTAR PUSTAKA

- Chung, J. H., J. H. Park, H. K. Choi, S. C. Lee, and C. S. Choi. 2010. "An analytical study on the impact of hollow shapes in bi-axial hollow slabs." *Fracture Mechanics of Concrete and Concrete Structures* (978-89-5708-182-2): 1729-1739.
- Churakov, A. 2014. "Construction of Unique Buildings and Structures." *Biaxial Hollow Slab with Innovative Types of Voids*.
- Dwivedi, Kumar Ashish, Prof. H. J. Joshi, Rohit Raj, Prakash Prem Mishra, Mamta Kadhan, and Baharati Mohabey. 2013. "International Conference on Multidisciplinary Research and Practice." *Voided Slab Design: Review Paper* 220-226.
- Jati, Dinar Gumiang. n.d. "Analisis Lentur Pelat Satu Arah Beton Bertulang Berongga Bola Menggunakan Metode Elemen Hingga Non Linier (051S)." *Konferensi Nasional Teknik Sipil 7 (KoNTekS 7)*.
- Kembuan, Patricia, Steenie E. Wallah, and Servie O. Dapas. 2018. "Jurnal Sipil Statik Vol.6 No.9." *Desain Praktis Pelat Konvensional Dua Arah Beton Bertulang* 705-714.
- Lai, Tina. 2010. "Structural Behavior of BubbleDeck* Slabs And Their Application to Lightweight Bridge Decks." Massachusetts Institute of Technology, Massachusetts.
- Mediyanto, A, Supardi, and Arditiya Pratama S. 2016. "Kajian Kuat Tarik Belah Dan Modulus of Rupture Beton Normal Dengan Bahan Tambah Abu Vulkanik Dan Serat Aluminium." *e-Jurnal Matriks Teknik Sipil* 790-798.
- Neville, A.M. 1975. *Properties of Concrete*. London: The English Language Book Society and Pitman Publishing.

- Sian, Buen, Adhijoso Tjondro, Riani Sidauruk, and Sisi Nova Rizkiani. 2013. "Uji Eksperimental Kuat Lentur Balok dan Pelat Beton Bertulang." (III/LPPM/2012-02/49-P).
- "SK SNI 03-2847-2002." *Tata Cara Perhitungan Struktur Beton untuk Bangunan Gedung.*
- "SK SNI 1974:2011." *Cara uji kuat tekan beton dengan benda uji silinder.*
- "SK SNI 2847-2019." *Persyaratan beton struktural untuk bangunan gedung dan penjelasan.*
- Sudarmoko. 1996. *Perancangan dan Analisis Pelat Beton Bertulang.* Yogyakarta: Biro Penerbit Fakultas Teknik Jurusan Teknik Sipil UGM.
- Szilard, R. 1974. *Tero dan Analisis Pelat Metode Klasik dan Numerik.* Jakarta: Erlangga.

LAMPIRAN

1. Proses Perakitan Bekisting dan Tulangan

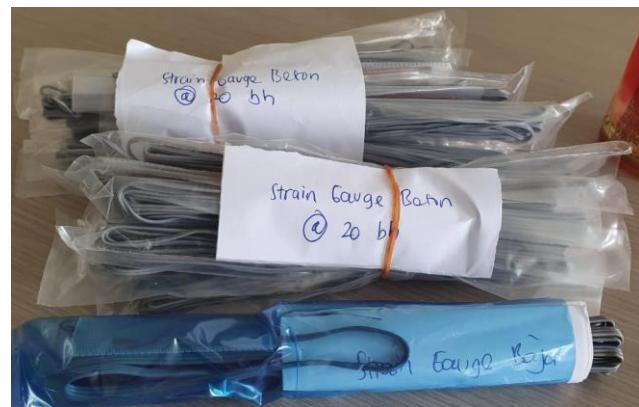


Perakitan Bekisting



Perakitan Tulangan

2. Proses Pemasangan Strain Gauge

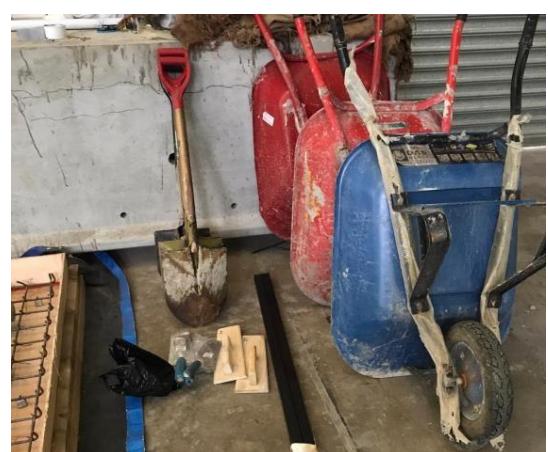


Strain Gauge Beton dan Baja



Pemasangan Strain Gauge

3. Proses Pengcoran Beton





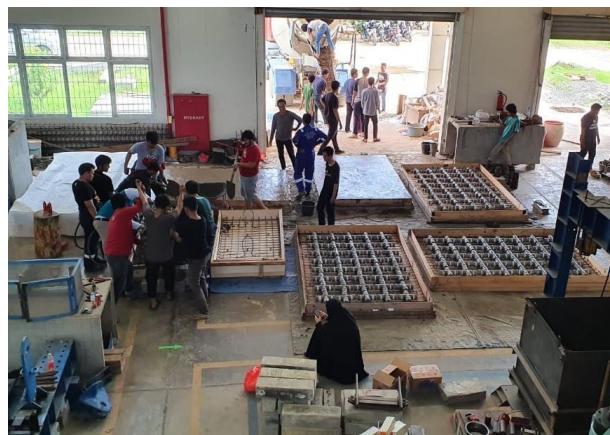
Persiapan Pengecoran



Persiapan Ready Mix

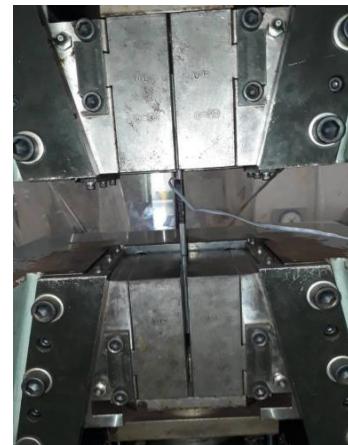


Proses Uji Slump



Penuangan Ready Mix ke bekisting dan penggunaan *Vibrator* pada campuran beton

4. Proses Pengujian Laboratorium



Pengujian Kuat Tekan Beton dan Tarik Tulangan



Pengujian Kuat Lentur dan Modulus Elastisitas Beton



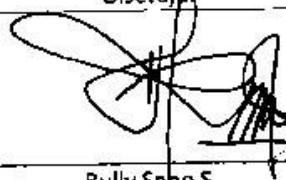
	PT. BOSOWA BETON INDONESIA FORMULIR		
JOB MIX DESIGN		No. Dokumen	SMT-FM-QAC-001.14
		Revisi	00
		Tgl Efektif	

Date : 31 JANUARI 2019
 Project : KAMPUS TEKNIK UNHAS
 Customer :

GRADE (Kg/cm ²)	K 350 + FA 30%	K 350
METHODE	MANUAL	MANUAL
NOMINAL SLUMP (Cm)	10±2	10±2
WATER CEMENT RATIO	0.39	0.44
CEMENT OPC CONTENT (Kg/m ³)	334	420
FLY ASH CONTENT (Kg/m ³)	143	0
NOMINAL WATER (Lt/m ³)	185	185
ADMIXTURE 1 : RETARDER (Lt/m ³)	1.5	1.9
ADMIXTURE 2 : SUPERPLAST (Lt/m ³)	2	2
COARSE AGGREGATE 10-20 mm (Kg/m ³)	890	920
FINE AGGREGATE (Kg/m ³)	770	840

Note :

The above mixes will comply with all the current requirements of SNI 03-2834 provided all aspects of sampling preparation and testing.

Disetujui	Dibuat
	
Rully Seno S	Muhammad Sultan
Head Div QC	Head Dept QC

 BOSOWA PT. BOSOWA BETON QC DEPARTMENT	DOC NO. : BBI WS 068-02	ISSUE NO. 1
	DATE :	PAGE 1 OF 1
	WORKSHEET SAND CONDITION ANALYSIS	

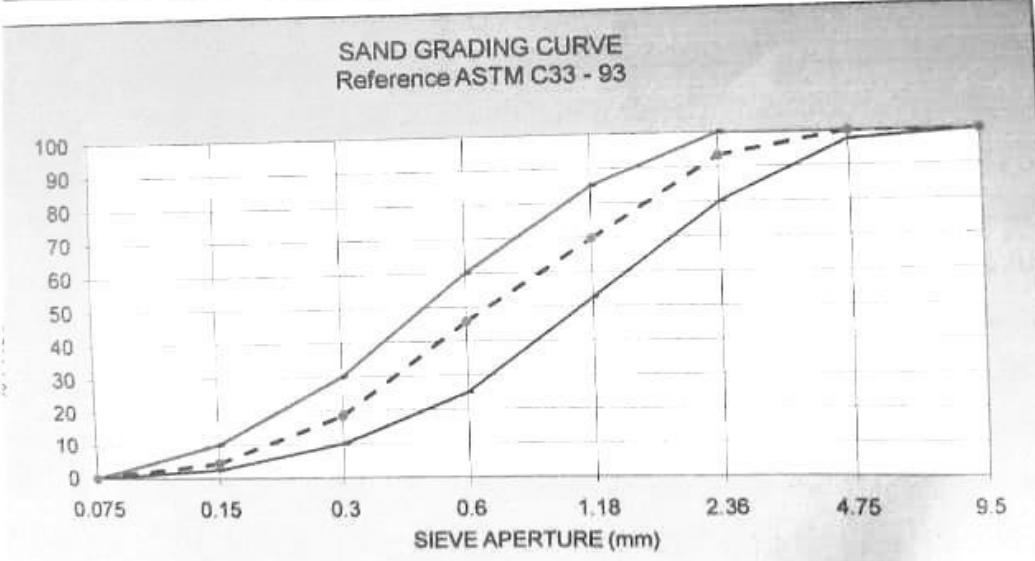
REF : The last version of BBI WI 043 , 044 , 045 , 087

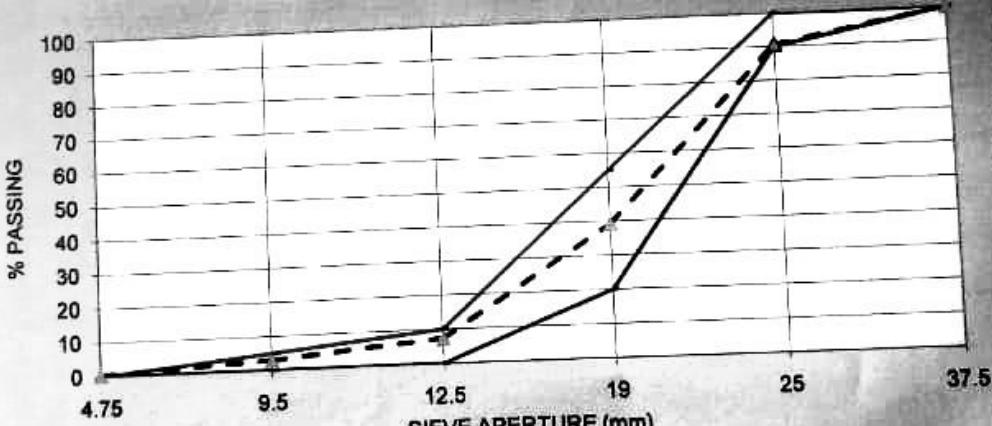
AMPLE IDENTIFICATION			
pile number	Date Received	2-Jan-20	
pile Source	BILI BILI	Date Tested	3-Jan-20
by		Tested by	ICSANG
of test	REGULER	Checked by	MUHAMMAD SULTAN
ng Location	MAKASSAR LAB		

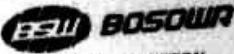
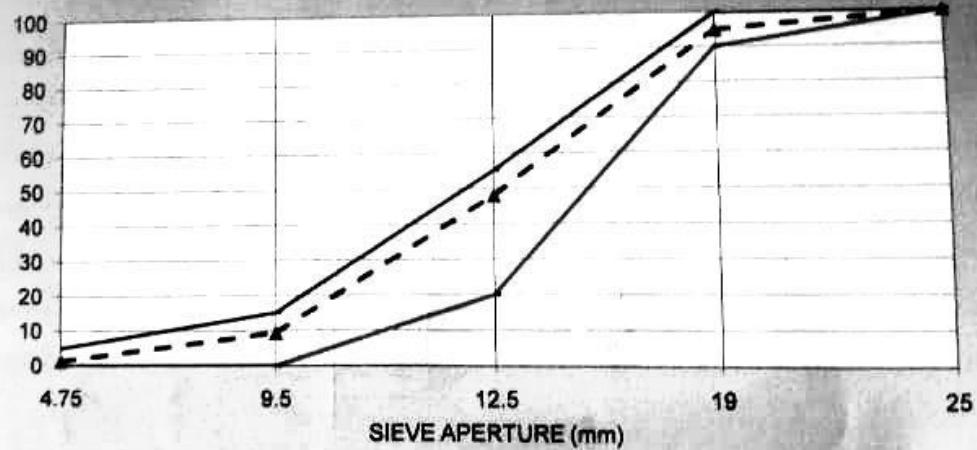
IT RESULT		
Item	Reference	Result
Wet Content , %	AS 1141 - 12 , BBI WI 043	4.40
Stress Modulus	ASTM C 136 , AS 1141,11,BBI WI 044	2.68
Water absorption , %	ASTM C 127 , BBI WI 045	3.02
Dry Content , %	ASTM C 566 , BBI 087	4.00
Specific Gravity	ASTM C 127 , BBI 045	2.58

VE ANALYSIS			
Reference ASTM C 33-93 , ASTM C 136 , AS 1141 - 11 , BBI WI 044			
Sieve Aperture (mm)	Retained Mass (gram)	% Retained	% Passing
9.5	0	0.00	100.00
4.75	0	0.00	100.00
2.36	67	6.70	93.30
1.18	303	30.30	69.70
0.6	542	54.20	45.80
0.3	816	81.60	18.40
0.15	955	95.50	4.50
PAN	1000	100.00	0.00

SAND GRADING CURVE
Reference ASTM C33 - 93



 BOSOWA PT. ROSOWA BETON QC DEPARTMENT	DOC NO. : BBI WI 085c - 02 ISSUE NO. 1 DATE : PAGE 1 OF 1 WORKSHEET 12,5 / 25 SPLIT CONDITION ANALYSIS <small>REF : The last version of BBI WI 042 , 043 , 044 , 087</small>																																
SAMPLE IDENTIFICATION <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Sample number</td> <td style="width: 33%;">BILI BILI</td> <td>Date Received</td> <td>2-Jan-20</td> </tr> <tr> <td>Sample Source</td> <td></td> <td>Date Tested</td> <td>3-Jan-20</td> </tr> <tr> <td>Sent by</td> <td></td> <td>Tested by</td> <td>ICSANG</td> </tr> <tr> <td>Type of test</td> <td>REGULER</td> <td>Checked by</td> <td>MUHAMMAD SULTAN</td> </tr> <tr> <td>Testing Location</td> <td>MAKASSAR LAB</td> <td colspan="2"></td> </tr> </table>		Sample number	BILI BILI	Date Received	2-Jan-20	Sample Source		Date Tested	3-Jan-20	Sent by		Tested by	ICSANG	Type of test	REGULER	Checked by	MUHAMMAD SULTAN	Testing Location	MAKASSAR LAB														
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<p style="text-align: center;">12,5/25 SPLIT GRADING CURVE <small>Reference ASTM C33 - 93</small></p>  <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <caption>Data points estimated from the grading curve graph</caption> <thead> <tr> <th>Sieve Aperture (mm)</th> <th>% Passing (12.5 mm Sieve)</th> <th>% Passing (25 mm Sieve)</th> </tr> </thead> <tbody> <tr> <td>4.75</td> <td>0</td> <td>0</td> </tr> <tr> <td>9.5</td> <td>~5</td> <td>~5</td> </tr> <tr> <td>12.5</td> <td>~15</td> <td>~15</td> </tr> <tr> <td>19</td> <td>~30</td> <td>~45</td> </tr> <tr> <td>25</td> <td>100</td> <td>100</td> </tr> </tbody> </table>		Sieve Aperture (mm)	% Passing (12.5 mm Sieve)	% Passing (25 mm Sieve)	4.75	0	0	9.5	~5	~5	12.5	~15	~15	19	~30	~45	25	100	100														
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 PT. BOSOWA BETON QC DEPARTMENT		DOC NO. : BBI WS 085c - 02 DATE : WORKSHEET 9,5 / 19 SPLIT CONDITION ANALYSIS REF : The last version of BBI WI 042 , 043 , 044 , 087	
SAMPLE IDENTIFICATION		Date Received : 2-Jan-20 Date Tested : 3-Jan-20 Tested by : ICSANG Checked by : MUHAMMAD SULTAN	
Sample number	SILI BILI		
Sample Source			
Sent by	REGULER		
Type of test	MAKASSAR LAB		
TEST RESULT		Reference	Result
Item			
Colloid Content , %	AS 1141 - 12 , BBI WI 044		0.74
Fineness Modulus	ASTM C 138 , AS 1141,11,BBI WI 044		0.94
Water absorption , %	ASTM C 127 , BBI WI 042		0.91
Moisture Content , %	ASTM C 566 , BBI 087		0.8
Specific Gravity	ASTM C 127 , BBI 042		2.62
SIEVE ANALYSIS		Reference : ASTM C 33-93 , ASTM C 138 , AS 1141 - 11 , BBI WI 044	
Sieve Aperture (mm)	Retained Mass (gram)	% Retained	% Passing
25	0	0	100
19	76	5.07	94.93
12.5	780	52.00	48.00
9.5	1360	90.67	9.33
4.75	1480	98.67	1.33
PAN	1500		
9,5/19 SPLIT GRADING CURVE Reference ASTM C33 - 93			
% PASSING	SIEVE APERTURE (mm)	 <p>The graph plots % Passing (Y-axis, 0 to 100) against Sieve Aperture (mm) (X-axis, 4.75, 9.5, 12.5, 19, 25). A solid line represents the experimental data, starting at approximately 5% at 4.75 mm and rising to about 98% at 19 mm. A dashed line represents the cumulative percentage passing, starting at 0% at 4.75 mm and reaching 100% at 19 mm. Vertical grid lines are present at 4.75, 9.5, 12.5, 19, and 25 mm.</p>	